

SERVICE INSTRUCTIONS

16, 18, 20 Litre
Continuous Flow Gas Water Heater

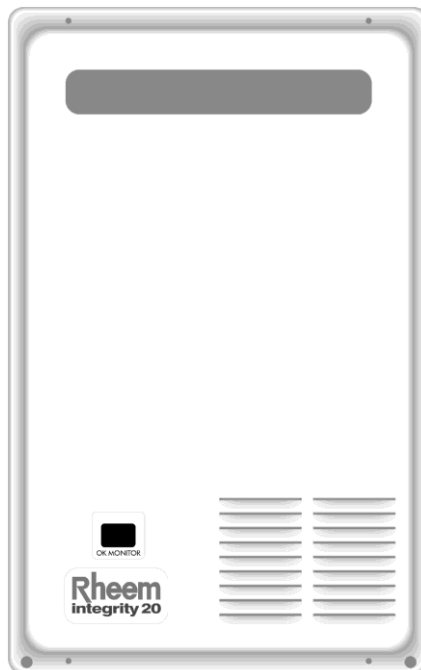
TM040



everhot

Revision: A

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Everhot	Vulcan	Rheem
274020	244016	874018
276020	244020	874020
	246016	876018
	246020	876020

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Introduction

The information provided in these service instructions is based on the water heater being installed in accordance with AS 5601 and the Installation Instructions provided with each water heater.

Should you require further technical advice on a continuous flow gas water heater, contact your nearest Rheem Service Department where genuine replacement parts are also available.

Safety Warning

The purpose of this service manual is to provide sufficient information to allow a person with the skills as required by the Regulatory Authorities to carry out effective repairs to a continuous flow gas water heater in the minimum of time.

Safety precautions or areas where extra care should be observed when conducting tests outlined in this service manual are indicated by print in ***bold italics*** and/or a warning symbol. Take care to observe the recommended procedure.



“Live” testing to be conducted. Personal Protective Clothing (PPE) shall be worn and an RCD shall be installed between the power point and 3-pin cord of the water heater to reduce the risk of electric shock.



Isolate power before conducting the indicated test



Hot surface or liquid. Personal Protective Clothing (PPE) shall be worn to reduce the risk of scalding.



General warning symbol. Observe the instructions accompanying the symbol.



If the supply cord is damaged, it must be replaced by the manufacturer or its service agent or a similarly qualified person in order to avoid a hazard.



When conducting repairs to a gas appliance the gas train including injector sizes must not be altered or modified in any way.

Water Heater Model Identification

The identification numbers are designed to convey detailed information about the water heater to which it is attached. The model number consists of 6 digits and up to 3 letters.

	87	4	020	N	F	/J
Model Number						
87 – Rheem						
27 – Everhot						
24 – Vulcan						
Temperature Setting						
4 – 60°C Set temp						
6 – 48°C Set temp						
Capacity						
Nominal litres/minute @ 25 °C rise						
Gas Type						
N – Natural						
P – Propane						
F – Frost protection fitted						
Casing Colour						
J – Joey Grey						
No letter – Refer below						
Casing colour variations:						
Rheem - Antique White						
Vulcan - Shale Grey						
Everhot - Joey Grey						

Specifications

Model		244016NF 244016PF 246016NF 246016PF		874018NF 874018PF 876018NF 876018PF		244, 274, 874020NF 244, 274, 874020PF 246, 276, 876020NF 246, 276, 876020PF	
Gas Type		NG	Prop	NG	Prop	NG	Prop
Max hourly gas consumption (MJ/Hr)		123		138		153	
Output (kW)		27.9		31.4		34.9	
Heating Capacity (L/min @ 40°C rise)		10.0		11.3		12.5	
Mass Empty (kg)		20		20		20	
Min inlet water pressure (kPa)		140		140		140	
Max inlet water pressure (kPa)		1000		1000		1000	
Min inlet gas pressure (kPa)		1.13	2.75	1.13	2.75	1.13	2.75
Max inlet gas pressure (kPa)		3.5		3.5		3.5	
Min burner gas test pressure (kPa)		0.170	0.190	0.170	0.190	0.170	0.190
Max burner gas test pressure (kPa)		0.645	0.880	0.758	1.100	0.870	1.185
Ignition System		Continuous Spark					
Power (Watts) Consumption	Standard	66		66		66	
	Anti-frost**	147		147		151	
Gas connection diameter (mm)		R ³ / ₄ /20		R ³ / ₄ /20		R ³ / ₄ /20	
Water connection diameter (mm)		R ³ / ₄ /20		R ³ / ₄ /20		R ³ / ₄ /20	
Relief Valve Pressure (kPa)		1750		1750		1750	
Kitchen Controller		Y		Y		Y	
Bathroom 1 Controller		Y		Y		Y	
Bathroom 2 Controller		Y		Y		Y	
Deluxe Kitchen Controller		Y		Y		Y	
Deluxe Bathroom 1 Controller		Y		Y		Y	
Deluxe Bathroom 2 Controller		Y		Y		Y	

** Maximum power consumption when anti-frost heaters are energised.



Preset Temperature Adjustment

Factory pre-set and maximum hot water outlet temperature settings for each water heater series are shown below:

Model	Factory setting	Maximum Temp	Solar Compatible
244, 274, 874 Series	60°C	60°C	Y
246, 276, 876 Series	48°C	48°C	N



Voltages up to 240 volts will be present within the water heater, take care not to touch wiring terminals. Use an insulated tool when operating the DIP switch or MIN and MAX buttons.

To adjust the preset temperature:

1. Remove the front cover from the water heater.
2. Turn DIP switches 3 and 4 ON (up position) on the PCB.
3. The temperature setting will be displayed by a series of flashes from the red LED, with a three (3) second pause between each series of flashes. The temperature settings and series of flashes are:

Preset Temperature Settings	Flashes	244, 274 874 series	246, 276, 876 series
Minimum temperature setting	1 flash	50°C	40°C
Mid temperature setting	2 flashes	55°C	43°C
Maximum temperature setting	3 flashes	60°C	48°C

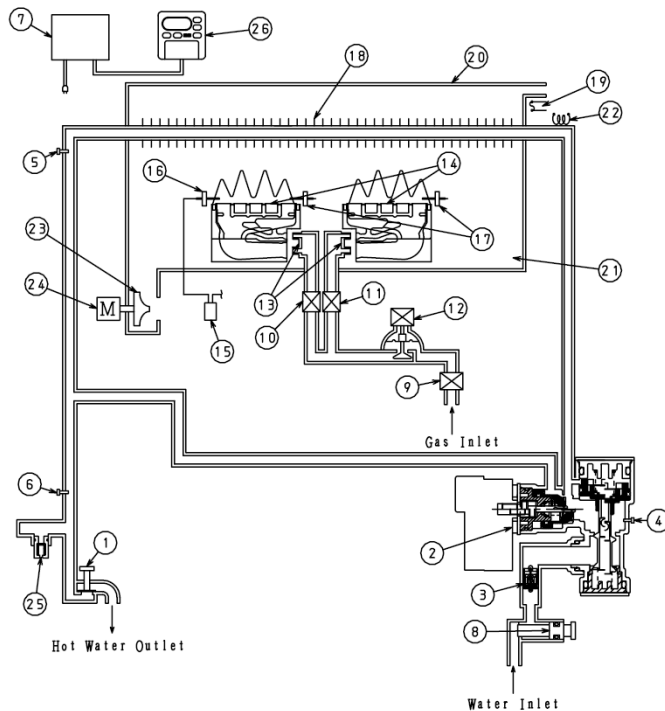
4. Press the MIN or MAX button, located above the DIP Switches, until the desired temperature is reached (indicated by the number of flashes from the red LED).
5. Turn DIP SWITCHES 3 and 4 off (down position).
6. The red LED will go out. The preset outlet temperature is now set.
7. Refit the front cover to the water heater.

Sequence of Operation

Refer to 'Sequence of Operation Component Diagram' on page 9 to view components shown in brackets e.g. **(1)**

1. When a hot water tap **(1)** is opened, cold water (or preheated water if a solar pre-heater is installed) enters the water heater and passes through the Water Flow Sensor **(3)** and Heat Exchanger **(18)**. Note: The inlet water temperature must be less than or equal to 58°C and less than or equal to the set point temperature minus 2°C for operation to occur past this point; otherwise water will pass straight through the heat exchanger and fan and burner operation will not occur (for more information on this subject refer to the section titled 'In-series Gas Boosting' on page 10).
2. The Water Flow Sensor **(3)** sends a pulse signal to the PCB **(7)**. Once the pulse signal reaches a pre designated frequency (at a min. flow rate of 2.5lpm) the PCB **(7)** activates the Fan Motor **(24)** and the Fan **(23)** starts rotating.
3. After the Fan **(23)** completes a pre purge, the Gas Inlet Solenoid Valve **(9)**, Gas Solenoid Valve 1 **(10)** and Gas Solenoid Valve 2 **(11)** open at the same time. The Proportional Gas Flow Regulating Valve **(12)** adjusts the gas flow rate to ensure adequate gas for ignition and gas is then supplied to the Burner **(14)**.
4. At the same time the Gas Solenoid Valves open the Igniter **(15)** starts sparking continuously and ignites the gas at the Burner **(14)**. After the flame sensor **(17)** detects burner flame, the Proportional Gas Valve **(12)** begins to control the gas flow rate. If there is a difference between the hot water temperature detected by the Hot Water Outlet Thermistor **(6)** and that set on the water heater or selected on the controller (if fitted) the PCB **(7)** adjusts the hot water temperature by opening and closing the Gas Solenoid Valve 1 **(10)**, the Gas Solenoid Valve 2 **(11)** and the Proportional Gas Flow Regulating Valve **(12)**. The water flow rate is also adjusted via the Water Flow Servo Motor **(2)** to ensure the selected temperature of hot water is delivered.
5. As the gas flow rate, controlled by the Proportional Gas Flow Regulating Valve **(12)** changes, the PCB **(7)** varies the speed of the Fan Motor **(24)** to maintain the correct air gas mix ratio.
6. When the hot tap **(1)** is closed, the pulse signal from the Water Flow Sensor **(3)** stops and the burner flame is extinguished by closing Gas Solenoid Valves 1 **(10)**, 2 **(11)**, and the Gas Inlet Solenoid Valve **(9)**. The post purge operation then commences.
7. Once the post-purge operation ends (up to 6 minutes) power to the Fan Motor **(24)** is cut and the Fan **(23)** stops.

Sequence of Operation Component Diagram



- 1) Hot Water Tap
- 2) Water Flow Servo Motor
- 3) Water Flow Sensor
- 4) Inlet Water Temperature Thermistor
- 5) Combustion Chamber Thermistor
- 6) Outlet Water Temperature Thermistor
- 7) PCB
- 8) Water Filter (Strainer)
- 9) Gas Inlet Solenoid Valve
- 10) Gas Solenoid Valve 1
- 11) Gas Solenoid Valve 2
- 12) Proportional Gas Solenoid Valve
- 13) Nozzle
- 14) Burner
- 15) Igniter
- 16) Igniter Electrode
- 17) Flame Sensor
- 18) Heat Exchanger
- 19) Over Temperature Limiter
- 20) Exhaust (Flue) Outlet
- 21) Combustion Chamber
- 22) Anti Frost Heater
- 23) Fan
- 24) Fan Motor
- 25) Drain Plug With Relief Valve.
- 26) Controller (Optional)

Bypass Operation

The bypass is a section of copper pipe work connected between the water body assembly (effectively the cold water inlet) and the outlet of the heat exchanger and allows a quantity of cold water to bypass the heat exchanger. The purpose of the bypass is to ensure the heat exchanger operates at temperatures above the dew point of the combustion gases, ensuring condensate is not produced, but low enough to maximise the heat exchangers life. A solenoid valve fitted to the water body assembly controls the bypass. The PCB activates the solenoid based on heat exchanger temperature and selected outlet water temperature.

Anti-Frost Heater Circuit

All models have an anti frost heater circuit. The anti-frost heaters are wired in series and operate independently from the water heater.

A thermostat sensing ambient air temperature, positioned in the wiring loom near the bottom of the water heater, activates the anti-frost heaters when the ambient air temperature falls to 4°C $+4^{\circ}\text{C}/-2^{\circ}\text{C}$ and deactivates the anti-frost heaters when the temperature rises above 12°C .

In the event a heater block becomes open circuit the total heater circuit is rendered inoperable. The circuit is split into two sections with 4 heaters in total.

Refer to 'Anti-Frost Heaters' on page 52 for replacement procedure.

In-series Gas Boosting



Temperature controllers must not be fitted if this water heater is installed as part of a solar water heater system because water at a temperature much higher than the controller setting can be delivered.



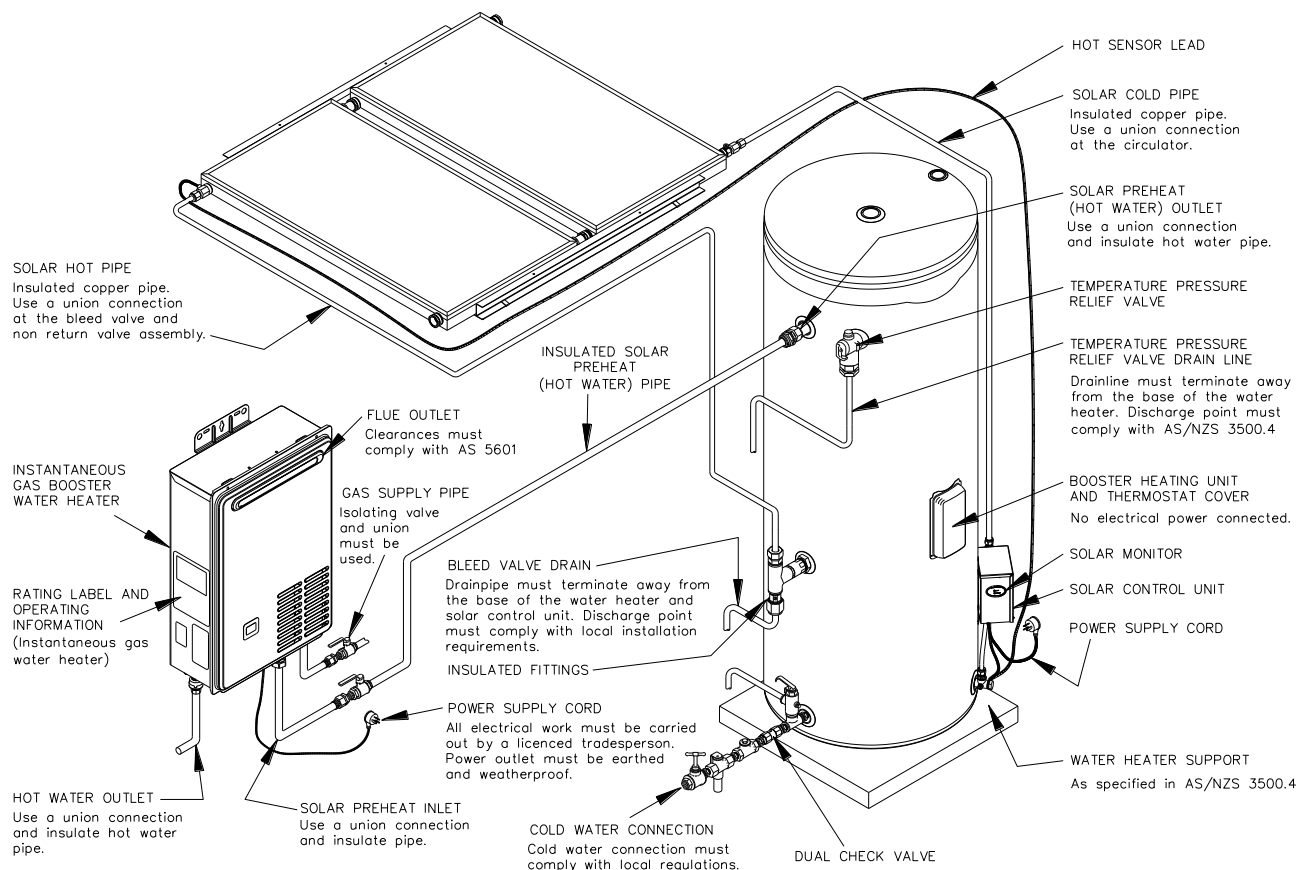
246, 276, 876 series water heaters are not suitable for use as in-series solar gas boosters.

The 244, 274, 874 series may be installed as an in-series booster water heater to a solar preheat water heater. In this application the outlet temperature setting of the heater must be set at 60°C. Refer to page 7 for details on checking and adjusting the outlet temperature.

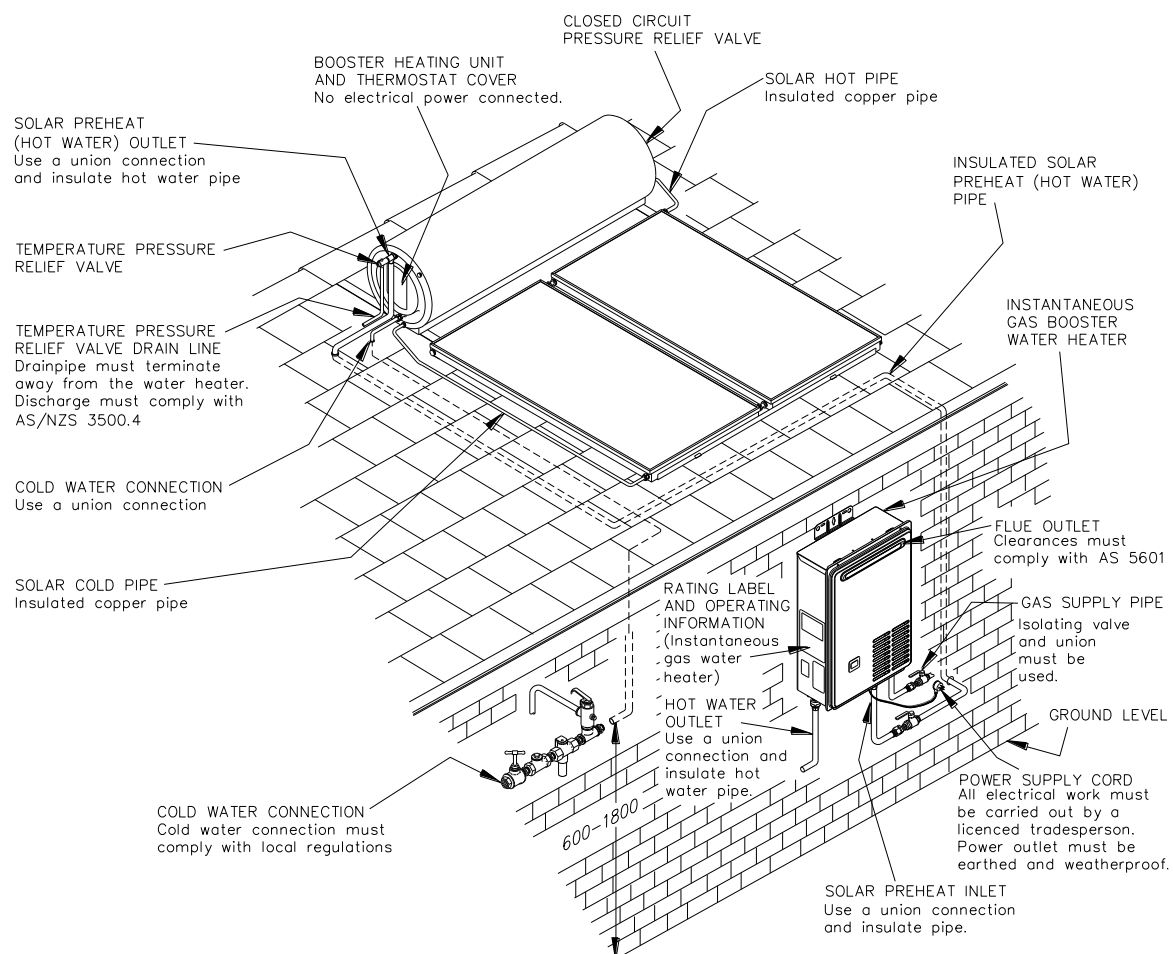
When the inlet water temperature is 58°C or higher the fan and burner will not operate despite water flowing through the heat exchanger. When the inlet water temperature is less than or equal to 57°C the burner will fire and boost the outlet temperature to 60°C provided the flow rate is greater than 3 litres per minute.

Note: If an existing 871 series Integrity water heater with a bypass valve is replaced with a 244, 274, 874 series heater, the solar bypass valve must be removed and the plumbing connections remade directly to the inlet and outlet water connections of the replacement 244, 274, 874 series water heater.

In-series Gas Boosting - Solar Loline Installation



In-series Gas Boosting - Solar Hiline Installation

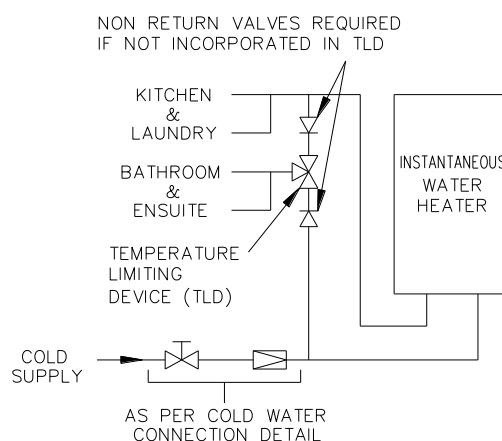


Tempering Valves

246, 276, 876 series models comply with AS/NZS 3498 and therefore do not require a tempering valve to be fitted unless the unit is installed in an early childhood centre, school, nursing home or a facility for young, aged, sick or disabled people.

It may be required by regulations that an approved temperature limiting device be fitted on 244, 274, 874 series models. Where a tempering valve is fitted and there is not a separate untempered line for the kitchen or laundry areas, the kitchen temperature controller will be able to display temperatures above 50°C however the delivered water temperature at the tap will be that set by the tempering valve which will be no hotter than 50°C.

To enable delivery of hot water at temperatures above 50°C a separate untempered line must be provided that supplies hot water exclusively to kitchen and laundry areas (refer to diagram).



Controllers

Continuous flow gas water heaters can be fitted with optional controllers as long as they are not being used in conjunction with a solar system. There are 2 types of controllers available, standard or deluxe:

Controller Type	Bathroom 1	Bathroom 2	Kitchen
Standard	299854	299855	299853
Deluxe	299859	299860	299858

Standard and deluxe controllers **cannot** be mixed in a single installation; other manufacturers' controllers cannot be used.

One, two or three unique controllers can be installed, however if a Bathroom controller is installed without a Kitchen controller then the maximum selectable hot water temperature will be limited to 50°C when connected to an 244, 274, 874 series model or 48°C when connected to an 246, 276, 876 series model.

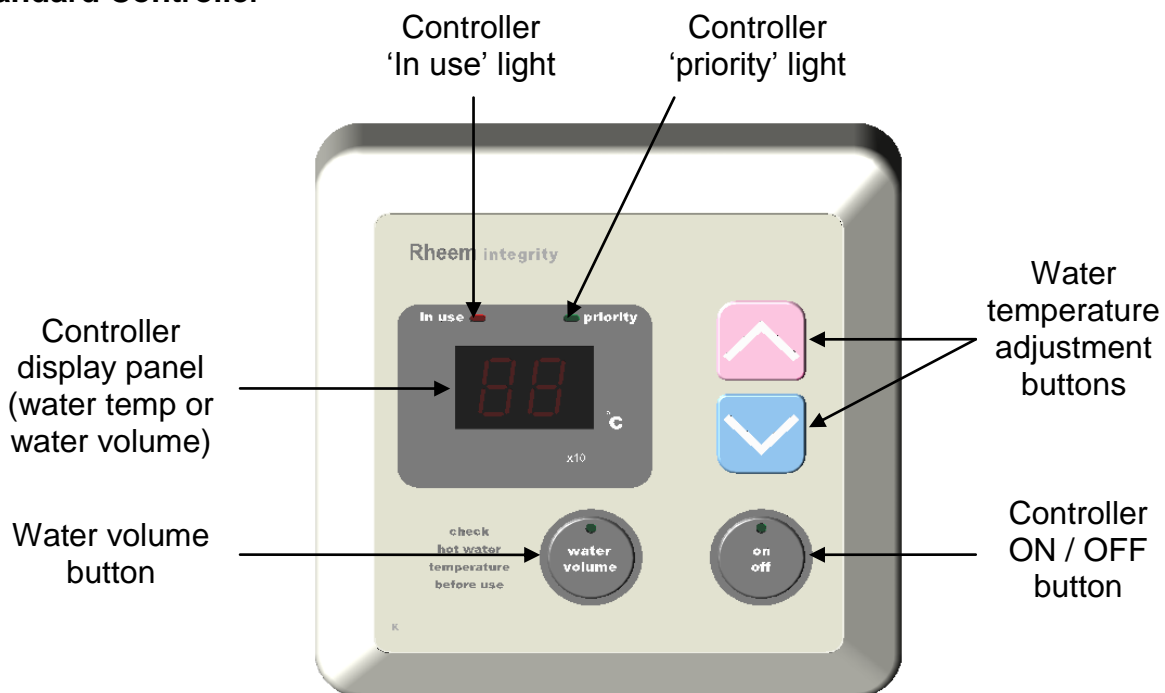
246, 276, 876 series models are factory set so that they cannot deliver water hotter than 48°C.

When no hot water is flowing, temperatures can be selected between 37°C and 43°C by pressing and holding the temperature control buttons, to select temperatures above 43°C press the temperature control button once for each selection.

A controller must be turned on and must display the 'Priority' indicator in order to allow adjustment of water temperature.

When hot water is flowing, the temperature can be increased from 37°C to 43°C only. The water temperature can be decreased from any setting whether hot water is flowing or not.

Standard Controller



Standard Controllers (cont'd)

Note: If one or more controllers are installed, at least one must be ON for the water heater to operate. If all controllers are OFF the water heater will only deliver cold water.

Selectable Temperatures:

Kitchen Controller:

37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 50*, 55*, 60°C*

Bathroom Controllers:

37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 50°C*

* Temperatures above 48°C are not available on controllers fitted to 246, 276, 876 series models as these units have a maximum selectable temperature of 48°C at all locations.

ON / OFF button	This button must be pressed once to turn on the controller. The light in the button will glow when the controller is on. A controller cannot be turned on if water is flowing from a hot tap. To turn off a controller, press the on / off button once. The light will go out. A controller can be turned off whilst water is flowing.
Priority light	This light will glow on a controller when that controller has priority. The Bathroom controller(s), if they are turned on, have priority over the Kitchen controller. Priority means that controller has control of the water heater temperature setting. The water temperature setting can only be adjusted by the controller that has priority.
In use light	This light will glow on all controllers, whether they are on or off, when hot water is flowing, regardless of which controller has priority.
Display panel	The current temperature setting is displayed on all controllers (whether hot water is flowing or not), when any controller is on. If all controllers are off, then the display remains blank. The water volume can also be displayed on the Kitchen controller. The x10l symbol glows when the water volume is displayed.
▲ (up button)	The up button increases the temperature setting.
▼ (down button)	The down button decreases the temperature setting.
water volume button	(Kitchen controller only) – This feature enables an alarm to sound when a set volume of water has flowed through the water heater (refer to notes below).

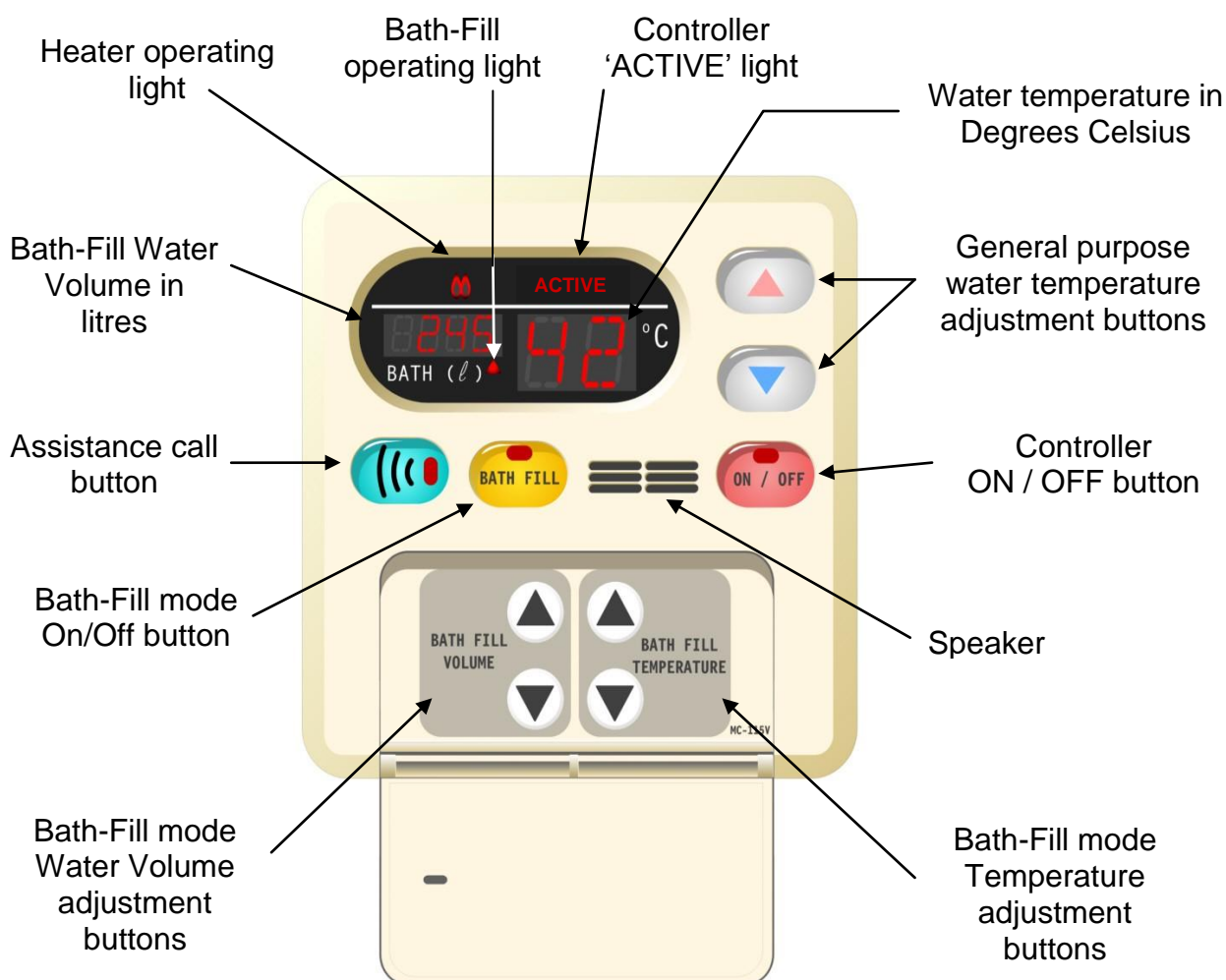
Water volume notes:

- The water volume function is designed to warn, by a beeping sound, that a certain volume of water has been delivered from the water heater. **It does not stop either the flow of or the heating of water.**

- The Kitchen controller does not require priority nor to be on in order to set the water volume function.
- The water volume function can be set whilst a hot tap is open.
- The water volume alarm will only sound from the kitchen controller.
- The factory preset water volume is 180 litres.
- To turn off the water volume function before the alarm sounds, press the water volume button twice.
- The water volume is measured as the water flows through the water heater. Therefore if more than one hot tap is open, the alarm will respond to the total water volume drawn from all taps and the expected water volume from the first tap will be decreased.
- If the hot tap is closed before the set water volume flows through the water heater and the water volume button is left on, then the alarm will sound when the remaining water volume is consumed during a later operation. To prevent the alarm from sounding, press the water volume button twice to turn it off.

Deluxe Controller

(Shown with Bath-Fill control cover open)



Note: If one or more controllers are installed, at least one must be ON for the water heater to operate. If all controllers are OFF the water heater will only deliver cold water.

Selectable Temperatures:

Deluxe Kitchen Controller:

37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 50*, 55*, 60°C*

Deluxe Bathroom Controllers:

37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 50°C*

Bath-Fill Mode – All Deluxe Controllers:

37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48°C

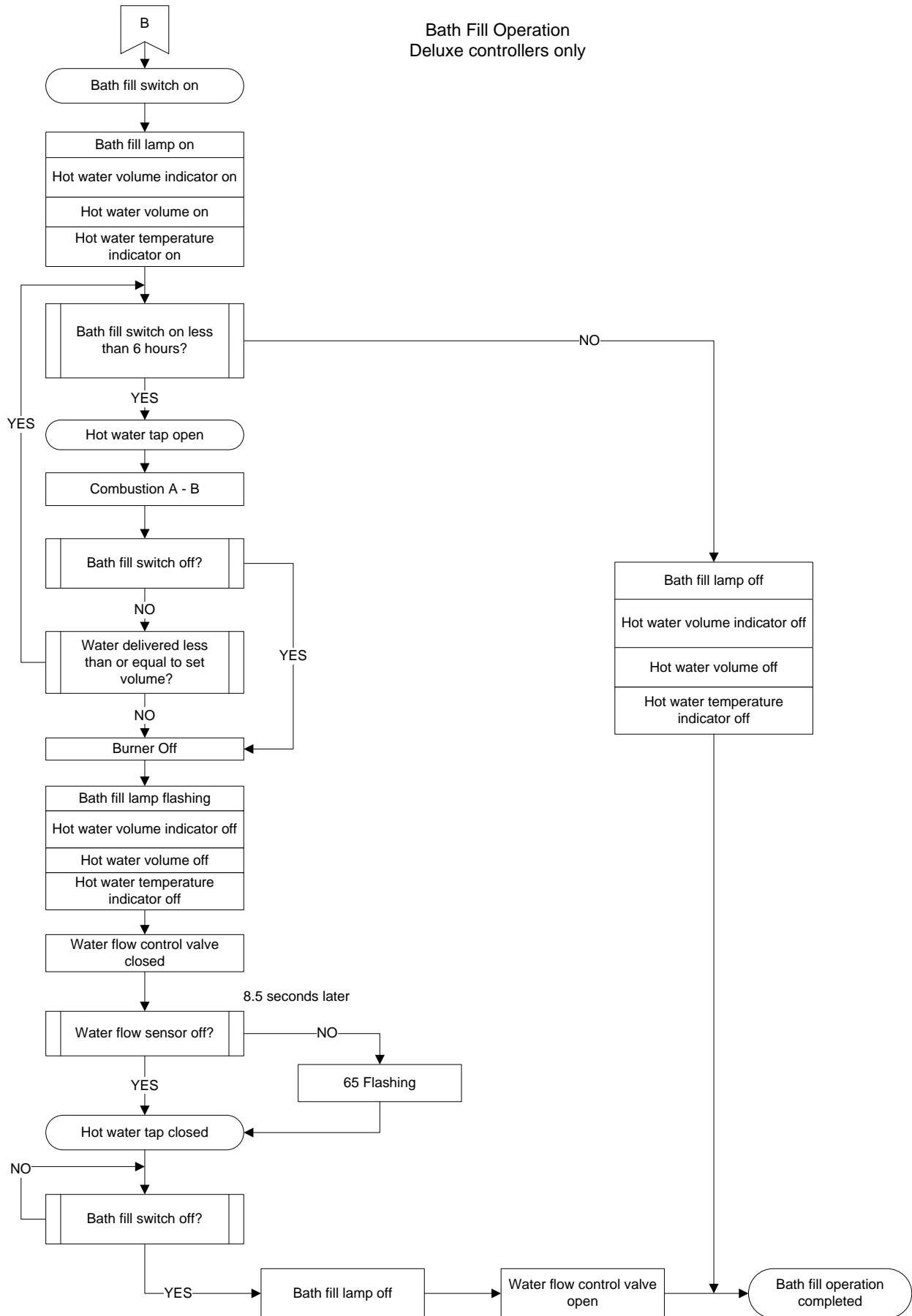
* Temperatures above 48 degrees are not available on controllers fitted to 246, 276 & 876 models as these units have a maximum selectable temperature of 48°C at all locations.

Deluxe Controller Functions

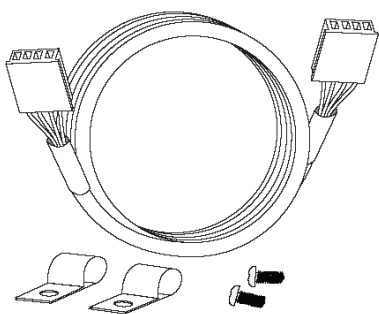
ON / OFF button	Press once to turn on the controller. The button will glow when the controller is on. A controller cannot be turned on if water is flowing from a hot tap. Press the button to turn off the controller. A controller can be turned off whilst water is flowing.
Bath-Fill button	Initiates Bath-Fill mode and once pressed will display the last used Bath-Fill water volume in litres and the last used Bath-Fill temperature in °C. The displayed Bath-Fill water volume and temperature can be adjusted by using the Bath-Fill water volume and temperature control buttons located beneath the hinged panel
Bath-Fill operating light	Illuminates whenever Bath-Fill mode is in operation.
Bath-Fill Temperature ▲ (up button)	Increases the Bath-Fill temperature setting.
Bath-Fill Temperature ▼ (down button)	Decreases the Bath-Fill temperature setting.
Bath Fill Water Volume ▲ (up button)	Increases the Bath-Fill water volume setting in increments of 10 litres up to 500 litres. A further setting of 990 litres can be selected
Bath Fill Water Volume ▼ (down button)	Decreases the Bath-Fill water volume setting
Assistance Call button	When pressed sounds a message or alert tone on the Kitchen Controller indicating that assistance is required in the bathroom.
Bath-Fill Water Volume display	Displays the selected Bath-Fill water volume in litres. The quantity of water can be adjusted using the Bath-Fill Water Volume adjustment buttons located beneath the hinged panel
Heater Operating light	Illuminates on all controllers when hot water is flowing
Heater ACTIVE light	Illuminates when that controller is 'active'. The Bathroom controller when turned on, have priority over the Kitchen controller. Priority means that a controller has control of the water heater temperature setting. The water temperature setting can only be adjusted by the controller that is displaying the ACTIVE message.
Temperature Display	Displays the current temperature setting on all controllers in °C when any controller is on. If all controllers are off the display remains blank.
▲ (up button)	Increases the general purpose temperature setting.
▼ (down button)	Decreases the general purpose temperature setting.

Bath Fill Operation

Bath Fill Operation
Deluxe controllers only



EZ-Link™ System



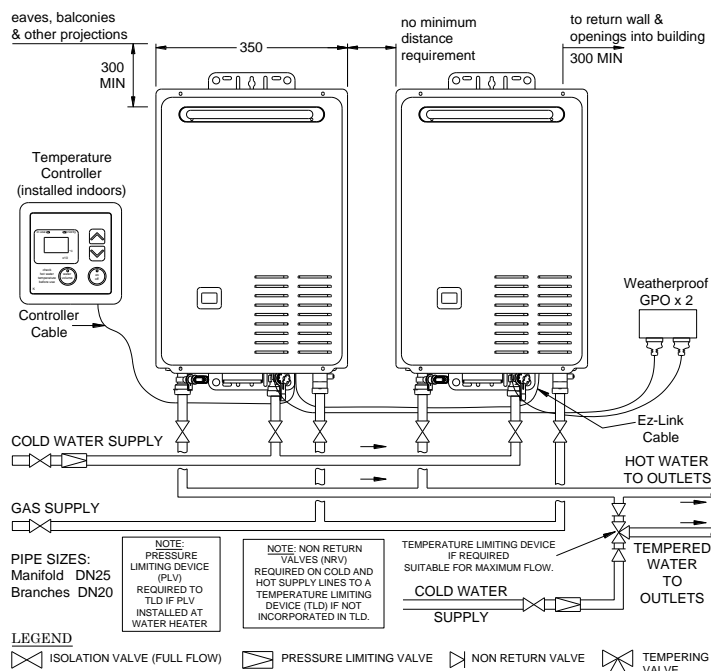
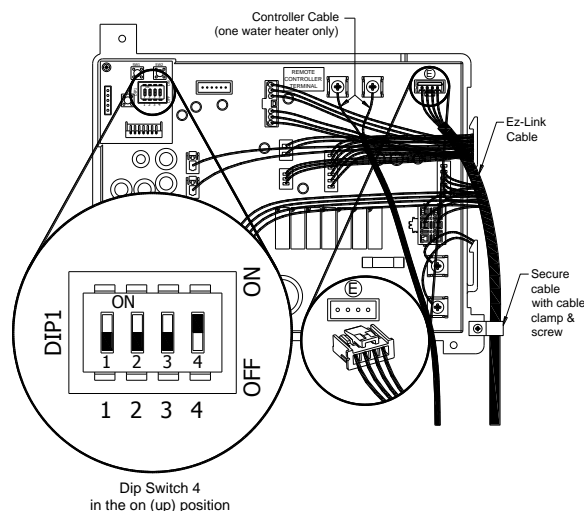
The EZ-Link system is used to electronically control two identical water heaters, plumbed in parallel, from the same temperature controller in order for them to operate as one.

Depending upon the hot water demand, one or both units may be in operation.

The EZ-Link system consists of a cable that is connected between the PCB's.

The cable is connected into connector E on each PCB and dip switch 4 is turned to the 'on' position in each water heater (refer to diagram opposite).

If it becomes necessary to test the operation of both units, increase the hot water flow by opening multiple hot water outlets simultaneously until both units operate.



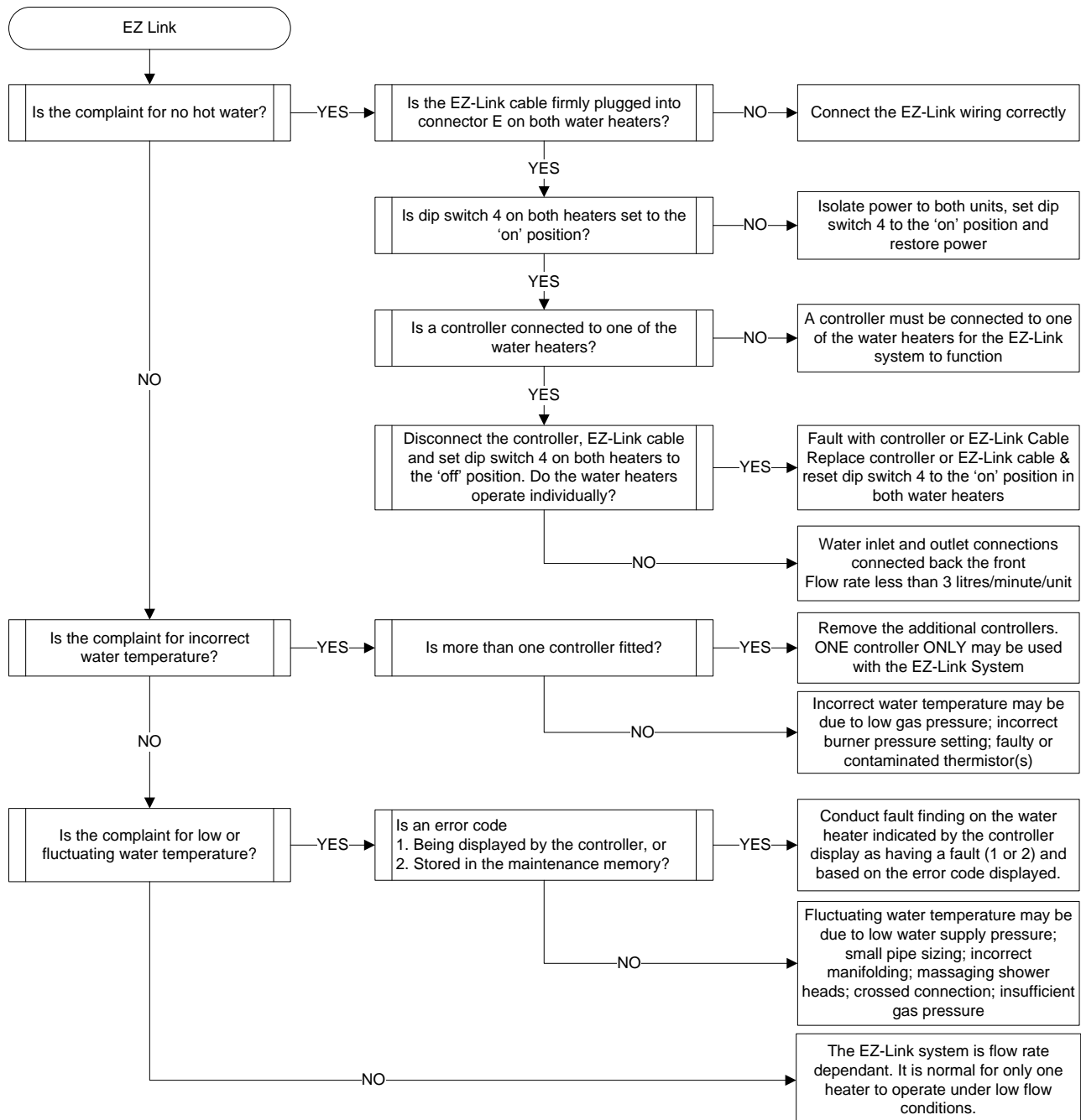
The diagram opposite details a typical installation utilising the EZ-Link system.

EZ-Link Error Code Display

If a fault is present with one of the water heaters connected via the EZ-Link system, in addition to displaying the normal error codes, the controller will also display a 1 or a 2 to indicate which unit is at fault.

1 indicates the unit to which the controller is connected has the fault, 2 indicates the unit which does not have the controller connected has the fault.

EZ-Link Fault Finding



About the Operational Flow Charts

The Operational Flow Charts provide information on the start up sequence and, in the event a failure occurs at any point of the start up sequence, what error code will be displayed. Error codes are displayed via the red LED mounted on the PCB (refer to page 27 for details regarding interpretation of LED flashing pattern). If fitted, the controllers will also display the full range of error codes.

The Sequence Number Table below indicates the section of the operational sequence (boxed numbers on the operational flow chart) where the fault occurred.

Circled numbers, adjacent to the component or function, indicate the diagnostic test point required to diagnose the fault. Refer to the table on page 25.

By locating the error code in the diagnosis charts the component/s or fault can be quickly identified and tested using the diagnostic procedures outlined in this manual.

Notes and Abbreviations used in the Operational Flow Charts

P.G.F.R Valve	Proportional Gas Flow Regulating Valve	F.F	Flame Failure
G.I.S.V.	Gas Inlet solenoid Valve	I.C	Integrated Circuit
O.H.L	Over Heat Limiter	S.V. 1	Solenoid Valve 1
I.U.I	In Use Indicator (Combustion Indicator)	S.V. 2	Solenoid Valve 2

Stepping gas rate change sequence by solenoid

Model	Step 1	Step 2	Step 3
16/18/20L	S.V. 1 ON	S.V. 2 ON	S.V. 1 & 2 ON

Burner Configuration (Burner Change-Over Assembly)

Model	Burner 1	Burner 2
16/18/20L	Right Solenoid (S.V. 1)	Left Solenoid (S.V. 2)

Sequence Number Table

Sequence Number	- 0 to -9	A0 - A9 P0 - P9	C0 - C9	E0 - E9	H0 - H9 J0 - J9 L0 - L9
Operational Flow Chart Section	1	2	3	4	5

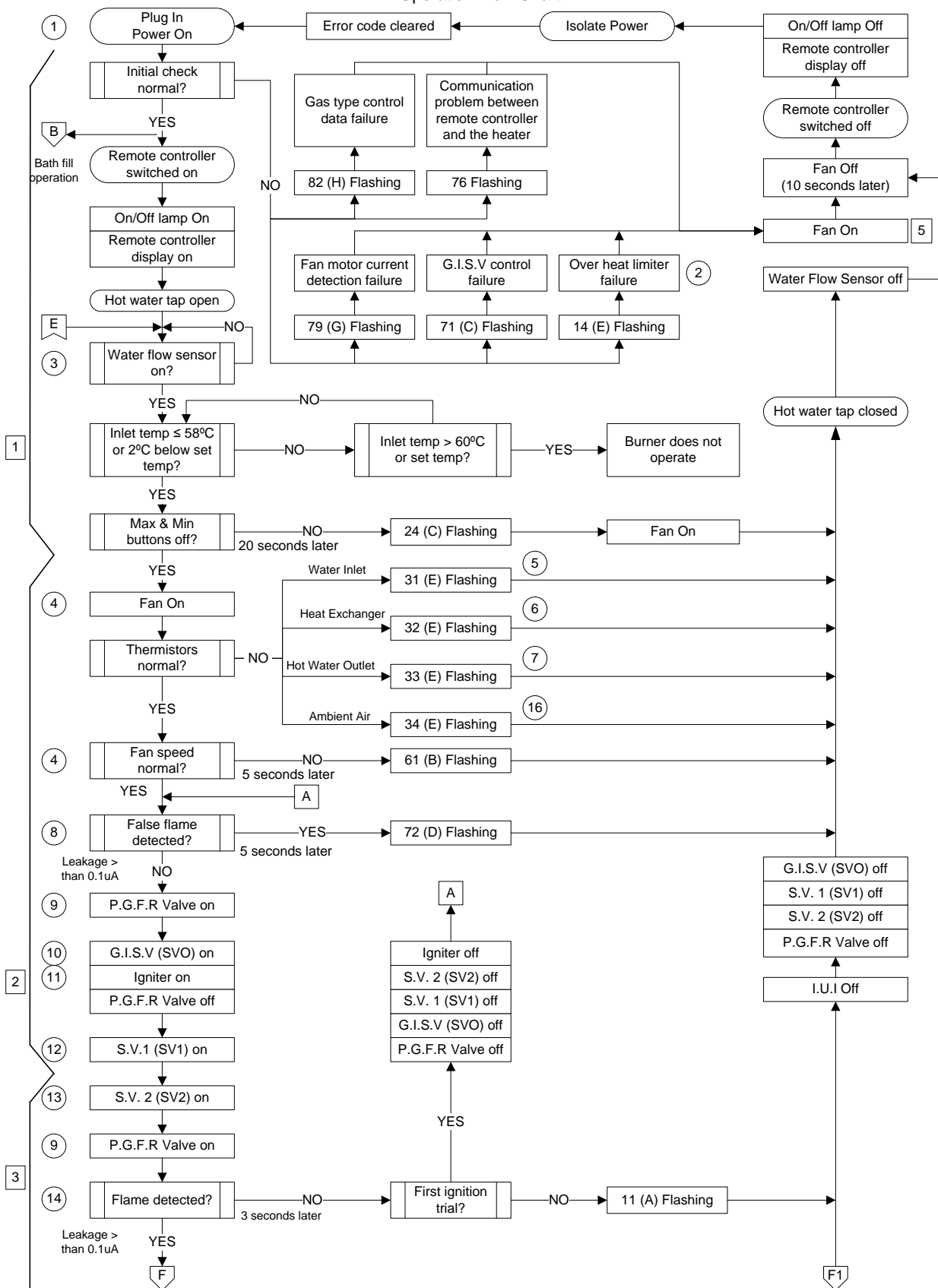
Test Equipment

A list of test equipment which will assist in conducting diagnostic procedures is provided below. This equipment is available from Rheem Service Spare Parts Department.

Flame detection simulator	WH0020080
Flame sensor current (uA) detection kit	WH0020081
Fine probe adapter kit	WH0020082
Heat exchanger fin brush	WH0020083
Probe to alligator clip kit	WH0020084

Operational Flow Charts

Operation Flow Chart 1



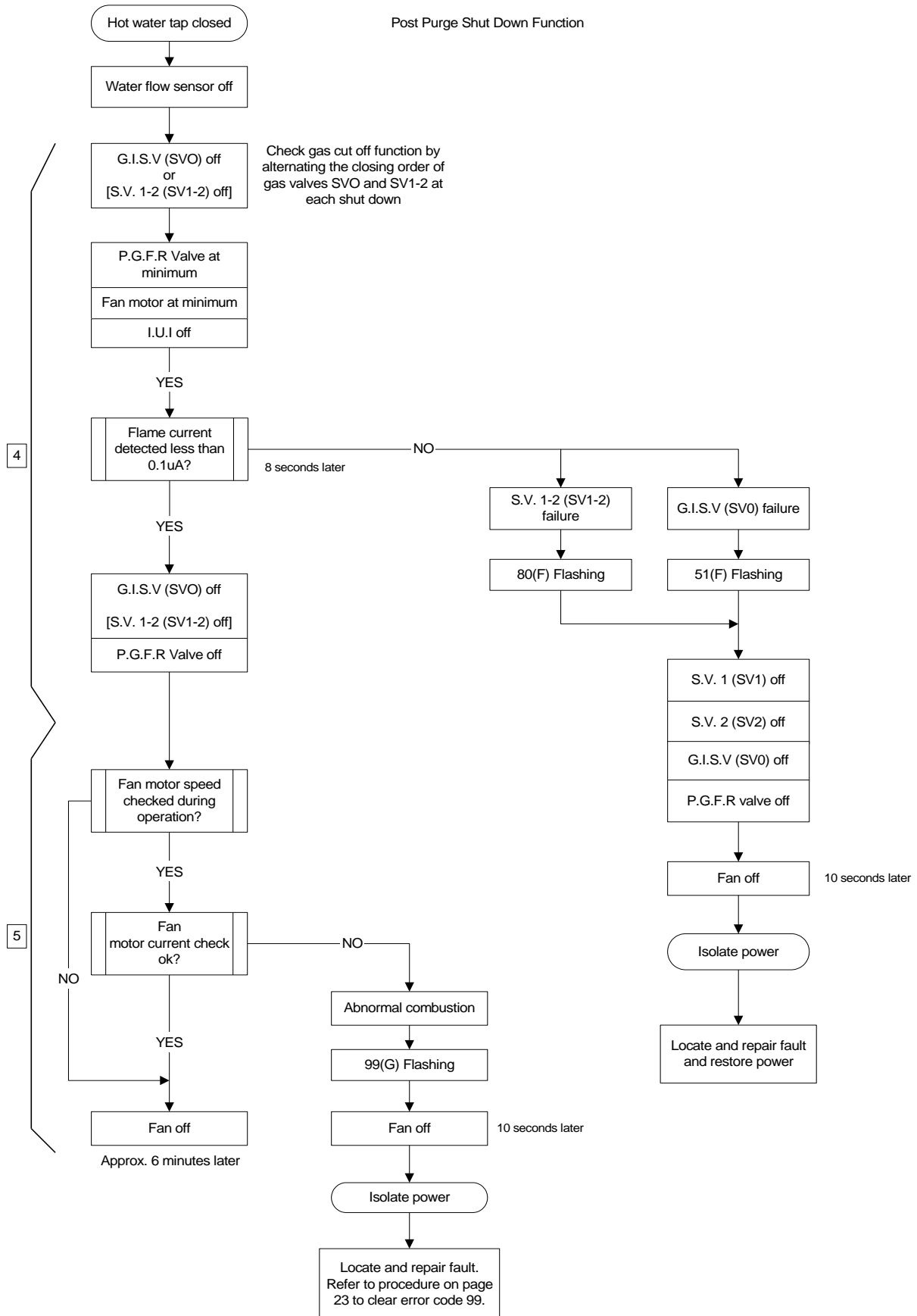
Note: Refer to page 20 for details on interpreting chart abbreviations. Refer to page 27 for details on interpreting LED flashing pattern.

```

graph BT
    F1[F1]
    F1 --- L1_Line
    L1_Line --- 81[81 (F) Flashing]
    L1_Line --- 14[14 (E) Flashing]
    L1_Line --- 15_1[15 (E) Flashing]
    L1_Line --- 15_2[15 (E) Flashing]
    L1_Line --- 16[16 (E) Flashing]
    L1_Line --- 99[99 (G) Flashing]
    81 --- Post[Post purge failure]
    14 --- OHL[O.H.L. failure]
    15_1 --- Temp1[Outlet water temp exceeded 97 degrees for more than 15 seconds]
    15_2 --- Temp2[Heat exchanger water temp exceeded 97 degrees for more than 15 seconds]
    16 --- Temp3[Outlet water temperature too high]
    99 --- Combustion[Abnormal combustion]
    Post --- 31[31 (E) Flashing]
    OHL --- 32[32 (E) Flashing]
    Temp1 --- 33[33 (E) Flashing]
    Temp2 --- 34[34 (E) Flashing]
    Temp3 --- 29[29 (G) Flashing]
    31 --- Water[Water inlet thermistor disconnected]
    32 --- Heat[Heat exchanger thermistor disconnected]
    33 --- Outlet[Outlet thermistor disconnected]
    34 --- Ambient[Ambient air thermistor disconnected]
    29 --- Heat2[Heat exchanger outlet temp too low]
    Water --- 71[71 (C) Flashing]
    Heat --- 76[76 Flashing]
    Outlet --- 79[79 (G) Flashing]
    Ambient --- Fan[Fan failure]
    Heat2 --- Malfunction[Malfunction of water volume control motor]
    71 --- GIV[G.I.S.V control failure]
    76 --- Comm[Communication problem between remote controller and water heater]
    79 --- Fan2[Fan motor current detection failure]
    GIV --- F1
    Comm --- F1
    Fan2 --- F1
    Fan --- F1
    Malfunction --- F1
    
```

Operational Flow Chart 3

Post Purge Shut Down Function



Note: Refer to page 20 for details on interpreting chart abbreviations. Refer to page 27 for details on interpreting LED flashing pattern.

Error Codes

The following table outlines the error codes, possible causes and diagnostic tests to conduct. More detailed diagnosis is outlined in the fault finding and operational flow charts.

Error Code	LED pattern	Fault Condition	Items To Check
05	-	Heat Exchange outlet temp too low	Heat Exchanger, Air inlet.
10	-	Abnormal low rate combustion	Blockage in the h/exchanger, fan, air intake or flue
11	A	Ignition failure at start up Cross light failure	P.G.F.R Valve - diagnostic point 9 G.I.S Valve - diagnostic point 10 Igniter - diagnostic point 11 Solenoid valves 1 & 2 - diagnostic points 12 & 13, Flame sensors 1 & 2 - diagnostic point 14
12	A	Flame failure during operation	P.G.F.R Valve - diagnostic point 9 G.I.S Valve - diagnostic point 10 Solenoid valves 1 & 2 - diagnostic points 12 & 13, Flame sensors 1 & 2 - diagnostic point 14
14	E	Over heating	Over Heat Limiter - diagnostic point 2
15	E	Very high temperature	Heat exchanger thermistor - diagnostic point 6 Hot water outlet thermistor - diagnostic point 7 P.G.F.R Valve - diagnostic point 9
16	E	Outlet water temp too high	P.G.F.R Valve - diagnostic point 9
24	C	Operational switch faulty	MAX or MIN button on IC board
29	G	Heat Exchange outlet temperature too low	Heat Exchanger, Clean air inlet.
31	E	Inlet thermistor open circuit	Water inlet thermistor - diagnostic point 5
32	E	Heat exchanger thermistor open circuit	Heat exchanger thermistor - diagnostic point 6
33	E	Outlet thermistor open circuit	Hot water thermistor - diagnostic point 7
34	E	Ambient air thermistor open/short circuit	Ambient air thermistor - diagnostic point 16
35	E	Thermistor connections crossed	Connection points of thermistors
51	F	G.I.S Valve failure	G.I.S Valve - diagnostic point 10 Flame sensor 1 & 2 - diagnostic point 14
52	C	P.G.F.R control failure	P.G.F.R Valve – diagnostic point 9 IC Board
61	B	Abnormal fan speed	Fan motor – diagnostic point 4
65	G	Malfunction of water volume control motor	Water volume control motor - diagnostic point 15
71	C	G.I.S valve control failure	Gas Inlet Solenoid Valve - diagnostic point 10 IC Board (PCB)
72	D	Detected false flame	Flame sensors 1 & 2 - diagnostic point 8
76	-	Communication problem between controller and water heater	Controller, IC Board or cable
79	G	Fan motor current detection failure	Fan motor – diagnostic point 4, IC Board
80	F	Gas cut off defective	Solenoid valve 1 & 2 - diagnostic points 12 & 13 Flame sensor 1 & 2 - diagnostic point 14
81	F	Post purge malfunction (Solenoid valve 1 failure)	Solenoid valve 1 & 2 - diagnostic points 12 & 13 Flame sensor 1 & 2 - diagnostic point 14
82	H	Functional problem on GTC board	Gas type setting failure, IC board
99	G	Abnormal combustion	Blockage in the heat exchanger, fan, air intake or flue way

Note: Refer to page 20 for interpretation of abbreviations. Refer to page 27 for details on interpreting LED flashing pattern.

Diagnostic Test Points

Refer to wiring diagram on page 6 for connector and wiring positions.

Test Point	Measuring Point		Normal Condition	Items Under Test
	Connector	Wire N ^o & colour		
1	H & I	R – R	AC 90V – 110V	Main Power
2	T	W1 – W2	50 kilo-ohms – 500 kilo-ohms	Overheat Limiter
3	R	BR1 – BK2	DC 2V– 5V(Pulse) * More than 1310 pulse/min	Water Flow Sensor pulse signal
		R3 – BK2	DC 11V – 17V	Water Flow Sensor
4	F	B4 – W6	DC 120V – 160V	Fan Motor
		R3 – B4	DC 12V – 18V	
		Y1 – B4	DC 4V – 10V(Pulse) * More than 4800 pulse/min	Fan Motor pulse signal
5	Q	W6 – BK3	@ 20°C – 10.3 kilo-ohms @ 40°C – 4.9 kilo-ohms	Water Inlet Thermistor
6	Q	Y5 – BK3	@ 20°C – 10.3 kilo-ohms @ 40°C – 4.9 kilo-ohms	Heat Exchanger Thermistor
7	Q	R4 – BK3	@ 20°C – 10.3 kilo-ohms @ 40°C – 4.9 kilo-ohms	Hot Water Outlet Thermistor
8	L & J	W1 – Earth	AC 3V – 20V **	Flame Sensor not detecting flame
	K & J	R1 – Earth	AC 3V – 20V **	
9	Q	R1 – BK2	DC 1.5V – 14.0V 40 ohms – 80 ohms	Proportional Gas Flow R. V
10	J	Y1 – BK5	DC 75V – 100V 0.8 kilo-ohms – 2.2 kilo-ohms	Gas Inlet Solenoid Valve
11	G	GY2 – GY5	AC 90V – 110V	Igniter
12	J	W2 – BK5	DC 75V – 100V 0.8 kilo-ohms – 2.2 kilo-ohms	Solenoid Valve 1
13	J	R3 – BK5	DC 75V – 100V 0.8 kilo-ohms – 2.2 kilo-ohms	Solenoid Valve 2
14	L & J	W1 – Earth	AC 1V – 100V **	Flame Sensor detecting flame.
	K & J	R1 – Earth	AC 1V – 100V **	
15	B	W2 – BK8	DC 8V – 16V	Water Volume Control Motor position switch
		R7 – BK8	DC 8V – 16V	
		GR6 – BK8	Less than DC 1V (Limiter on) DC 4V – 6V (Limiter off)	
16	Q	B7 – BK3	@ 20°C – 10.3 kilo-ohms @ 40°C – 4.9 kilo-ohms	Ambient Air Thermistor

NOTES:

* : Approximate reading measured by digital multimeter on DC range.

** : Approximate reading measured by digital multimeter on AC range.

Maintenance Information

Information relating to both the current and past operation of the water heater can be obtained from the memory; this information is referred to as the maintenance information.

The table below details the information that can be recalled from the memory i.e. to view the current temperature being measured by the outlet thermistor select 5Y, refer to page 27 for the procedure to display maintenance information.

Maintenance Table

		Left digit in LED display (Numerical)									
		0	1	2	3	4	5	6	7	8	9
Right digit in LED display (Alphabetical)	E	Management Number	Error Code for the previous 8 faults								Management Number
	F	Null	Sequence number of the previous 8 faults								Null
	C	Total combustion starts X 10,000	Total combustion operations since last error X 10,000 hours								Null
	D	Total combustion starts X 100	Total combustion operations since last error X 100 hours								Null
	H	Total combustion period X 1000 hrs	Total combustion period since last error X 1,000 hours								Null
	J	Total combustion period X 10 hrs	Total combustion period since last error X 10 hours								Null
	Y	Flame sensor status (See table below)	Water Flow Sensor Litres / minute	Ambient Air Thermistor temp. °C	Water Inlet Thermistor temp. °C	Heat Exchanger Thermistor temp °C	Hot Water Outlet Thermistor temp °C	Fan speed X100 RPM	Power for P.G.F.R Valve	Null	Null
	A	Null	Null	Fan detective value	Fan Motor Current	Fan Motor current curve - average	Fan Motor current curve - after tap closure	Fan Motor current curve - present combustion	Null	Null	Sequence number

Flame Sensor Status

Model	All 16, 18 & 20L Models			
0y Information	00	01	02	03
Flame Sensor 1	X	O	X	O
Flame Sensor 2	X	X	O	O

X = Flame sensor is not detecting flame. **O** = Flame sensor is detecting flame

Displaying Maintenance Information

With Controller:



Isolate power whilst connecting a controller.

1. Fit controller if not already fitted.
2. Restore power supply and ensure the controller is turned on.
3. Press the temperature increase and decrease buttons simultaneously for 3 seconds.
4. Use the temperature decrease button to change the left digit (0→1etc.) in the controller display to the required maintenance code identified from the maintenance table on page 26.
5. Use the temperature increase button to change the right digit (E→F etc.) in the controller display to the required maintenance code identified from the maintenance table on page 26.
6. The maintenance code and the value of that code will alternate on the LED display of the Controller.
7. Press the on/off button twice on the controller to cancel maintenance information.

Without Controller:

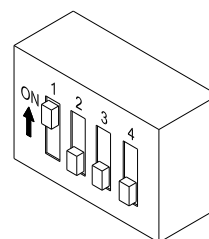


Voltages up to 240 volts will be present within the water heater, take care not to touch wiring terminals. Use an insulated tool when operating the DIP switch or MIN and MAX buttons.

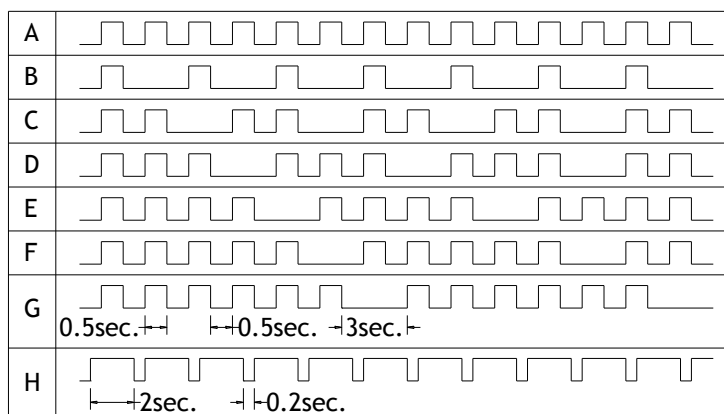
If a controller is not fitted, the red LED on the PCB can be used to show error code history. This method will only provide limited information regarding error codes. Specific maintenance information as listed on page 26 is not available unless a controller is fitted.

1. If the unit is in a fault condition, the red LED on PCB will be flashing. Previous error codes can be viewed by modifying the dip switch positions as below:

Dip Switch	1	2	3	4	State of Display
State of Switch	OFF	OFF	OFF	OFF	Normal Mode
	ON	OFF	OFF	OFF	Latest Error Code
	OFF	ON	OFF	OFF	2nd Error Code
	ON	ON	OFF	OFF	3rd Error Code



2. The red LED will flash in a specific pattern. Refer to adjacent chart in conjunction with error code information on page 24 to determine fault.



Clearing Error Code History



Voltages up to 240 volts will be present within the water heater, take care not to touch wiring terminals. Use an insulated tool when operating the DIP switches or MIN and MAX buttons.

After repairing the water heater the existing error code history should be cleared. This will allow fresh data to be stored and reduce the risk of confusion should it be necessary to service the water heater in the future.

To clear the error code history:

1. Ensure all controllers (if fitted) are turned off and all hot taps are closed.
2. Remove the front panel of the water heater.
3. Ensure all DIP SWITCHES are in the off position (down position).
4. Turn DIP SWITCH 1 on (up position) and then off (down position) again.
5. Within 5 seconds of turning DIP SWITCH 1 off, press and hold either the MIN or MAX button for more than 2 seconds.
6. Refit the water heater front panel.

Resetting Error Codes

Most error codes can be reset by shutting off the hot water flow and turning the controllers (if fitted) off and then on again. It may also be necessary to isolate and restore the power. Where controllers are not fitted it may be necessary to turn the power off at the water heater to clear the error code.

To reset Error Code 99 it is necessary to:

1. Ensure all controllers (if fitted) are turned off and all hot taps are closed.
2. Ensure all DIP SWITCHES are in the off position (down position).
3. Turn DIP SWITCH 2 on (up position) and then off (down position).
4. Within 5 seconds of turning DIP SWITCH 2 off, press and hold both the MIN and MAX buttons for more than 2 seconds.
5. Refit the water heater front panel.

Fault Finding



When measuring **resistance** of a part, turn off the electric power and be sure to disconnect the part completely before measuring (from connector or terminal). Resistance checks are performed on the part while it is disconnected from the control board.



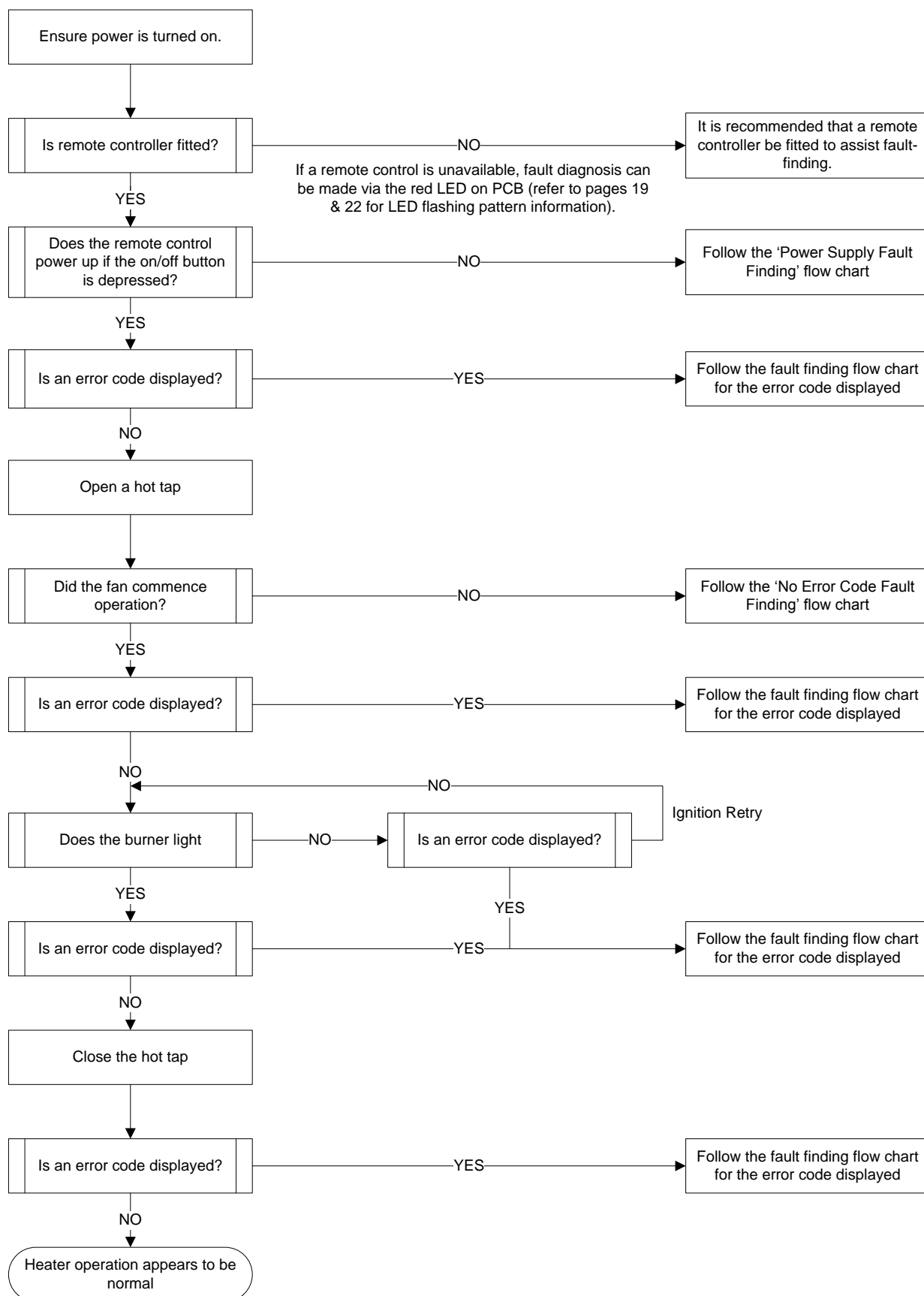
“Live” testing to be conducted. Personal Protective Clothing (PPE) shall be worn to reduce the risk of electric shock. Refer to Rheem Safety Procedure on electrical testing.

All Molex connections only go to one location and fit one way. You do not need to force a connection. Connections are also colour coded to aid in reassembly.



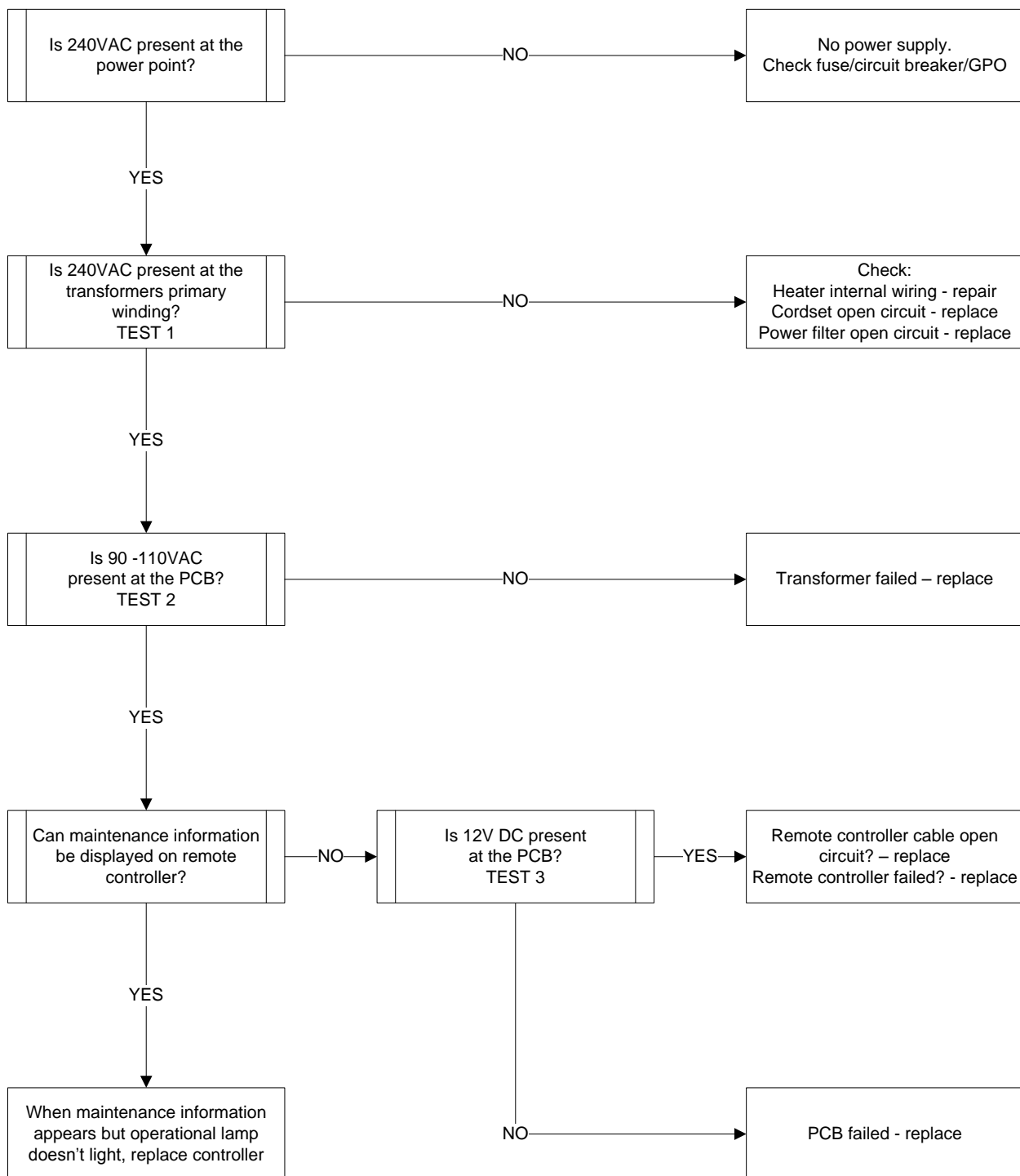
CAUTION: When performing maintenance and/or servicing the water heater, wait for the water heater to become cool. Be careful to avoid injury on the sharp edges.

Fault Diagnosis Sequence



The red LED on PCB can only supply limited information. For specific fault identification use a controller.

Power Supply Fault Finding

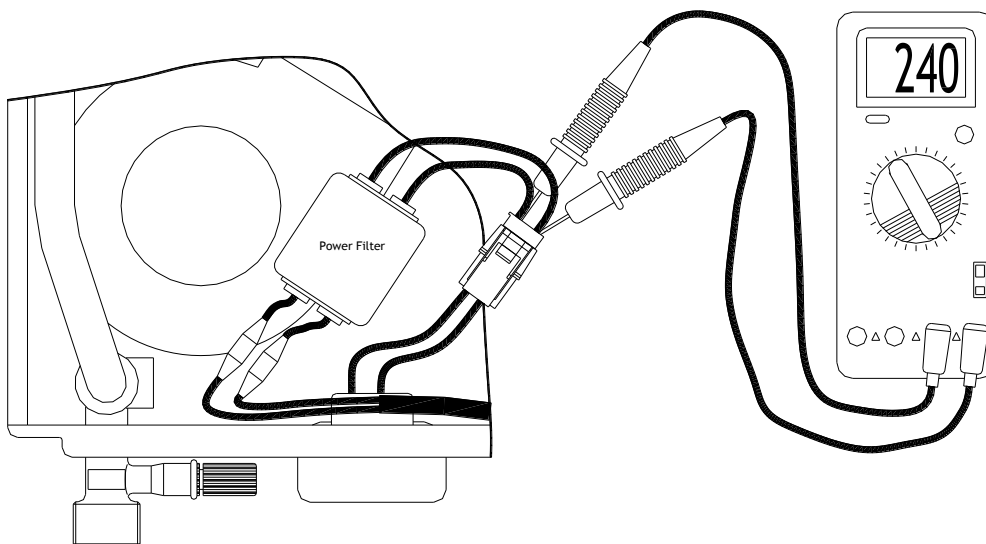


Fault Finding Tests 1 – 3



Components will be “Live” when conducting tests, exercise caution.

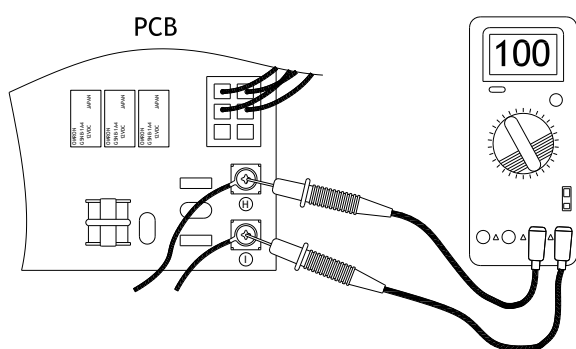
Test 1



Using a multimeter set on the AC volts scale, measure the voltage at the connector plug to the transformer primary winding.

Normal voltage is between 230V and 250V.

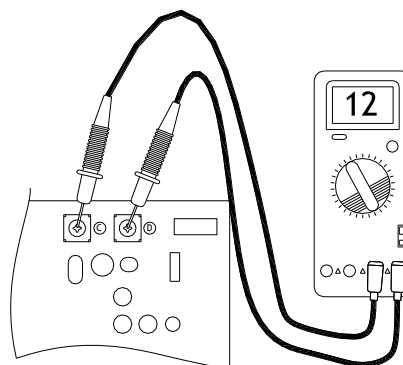
Test 2



Using a multimeter set on the AC volts scale, measure the voltage between red wires at terminals H & I on the PCB.

Normal voltage is between 90V and 110V.

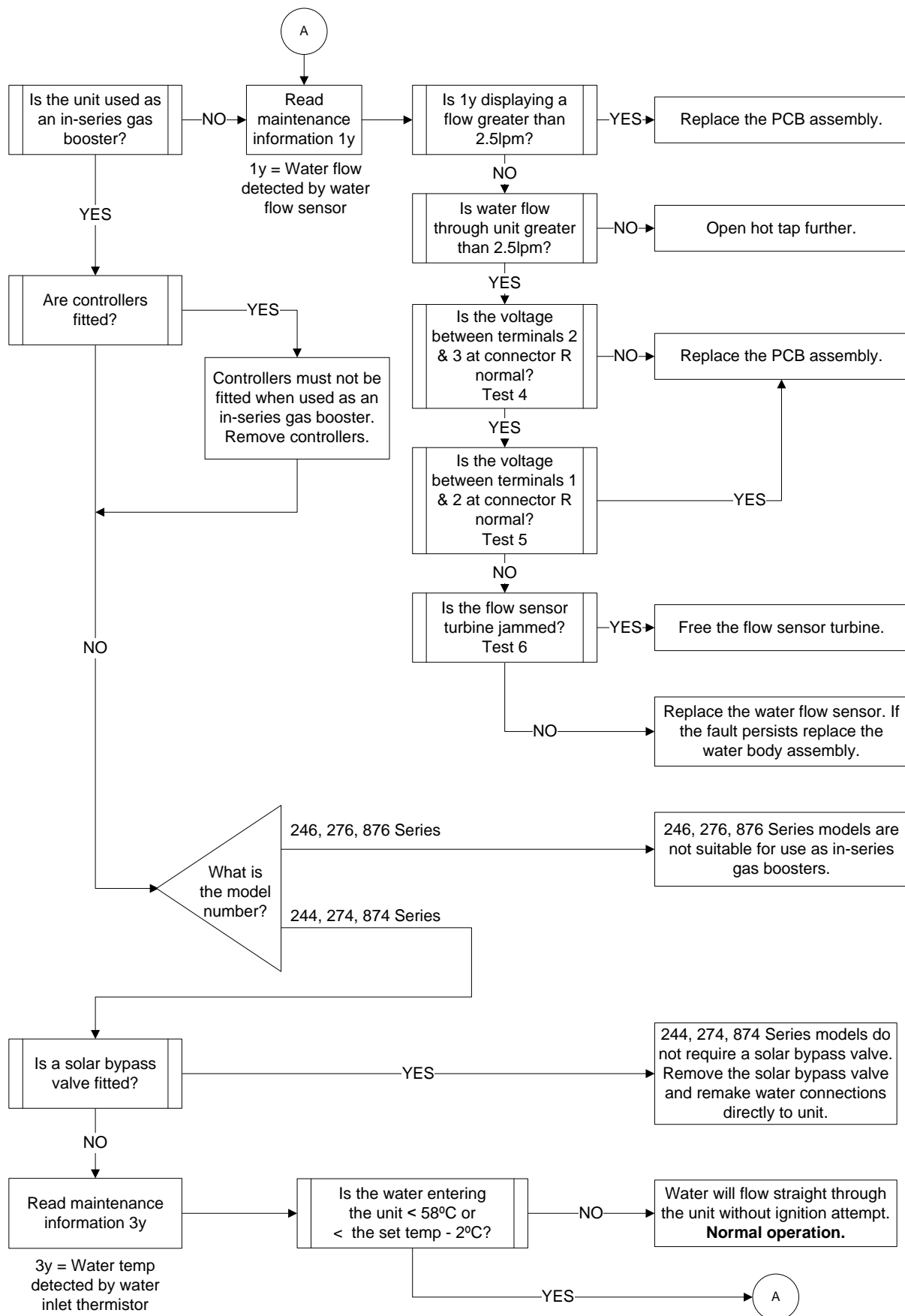
Test 3



Using a multimeter set on the DC volts scale, measure the voltage between terminals C & D on the PCB.

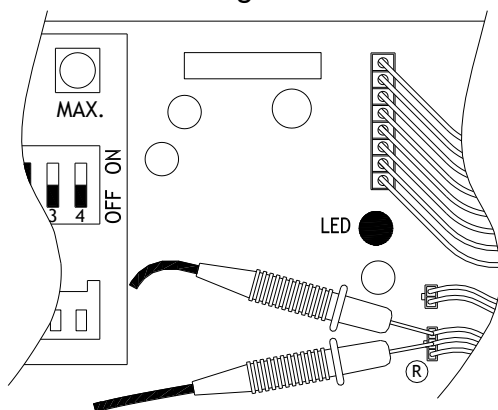
Normal voltage is 12V.

No Error Code Fault Finding



Fault Finding Tests 4 – 6

Test 4 - Diagnostic Point 3

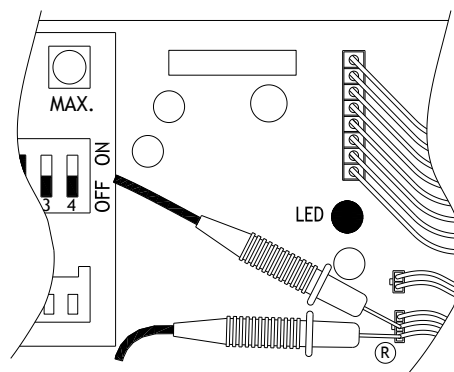


Conduct test with water flowing.

Using a multimeter set on the DC volts scale, measure the voltage between 3 Red and 2 Black on connector R.

Normal voltage should be between DC11 – 17V.

Test 5 - Diagnostic Point 3

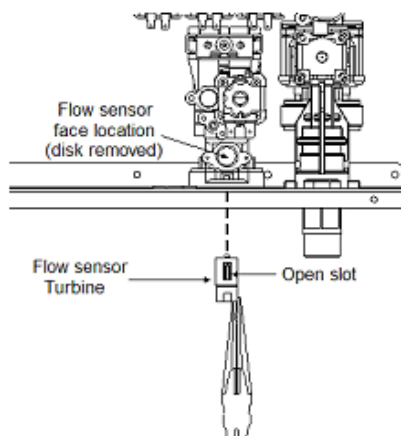


Conduct test with water flowing.

Using a multimeter set on the DC volts scale, measure the voltage between 1 Brown and 2 Black on connector R.

Normal voltage should be between DC2 – 5V.

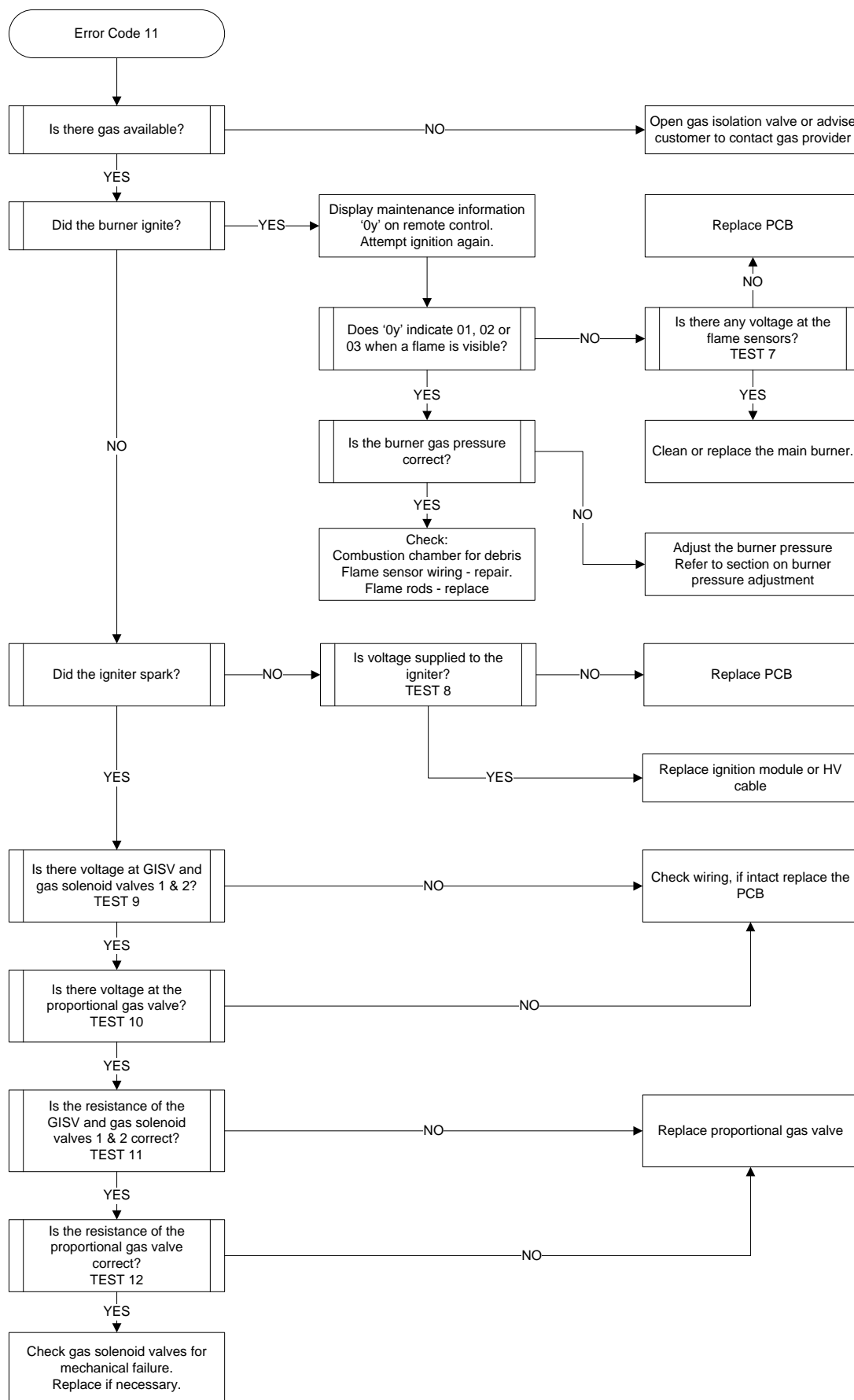
Test 6



Remove the flow sensor turbine. Refer to 'Flow Sensor Turbine' procedure on page 51.

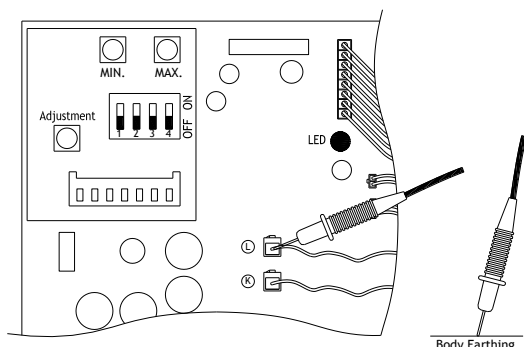
The flow sensor turbine should spin freely. Check for wear or blockage by foreign material such as thread tape. The power must be isolated during water flow sensor removal.

Error Code 11



Fault Finding Tests 7 – 12

Test 7 - Diagnostic Point 8

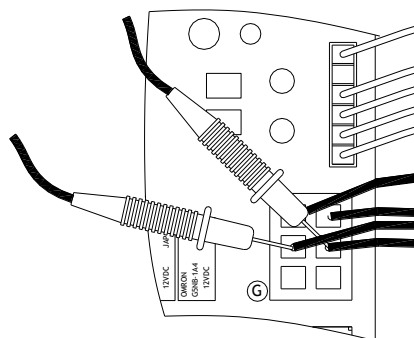


Conduct test with no water flow

Using a multimeter set on the AC volts scale, measure the voltage between terminals W1 on connector L and earth and between terminals R1 on connector K and earth.

Normal voltage should be between AC3 – 20V.

Test 8 - Diagnostic Point 11

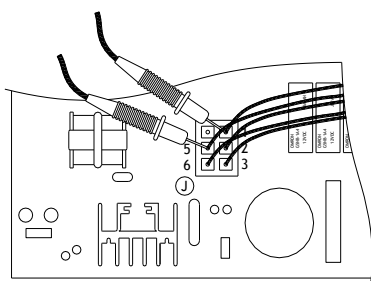


Conduct test with water flowing

Using a multimeter set on the AC volts scale, measure the voltage between the grey wires at connector G.

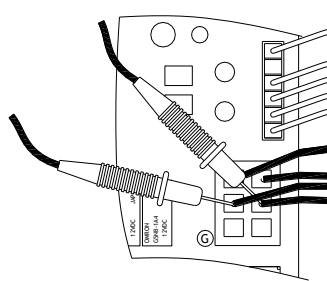
When ignition sequence commences, voltage should be between 90 - 110VAC until flame is detected. (Note: Duration is approx 3 seconds)

Test 9



Using a multimeter set on the DC volts scale, measure the voltage with connector J plugged into PCB.

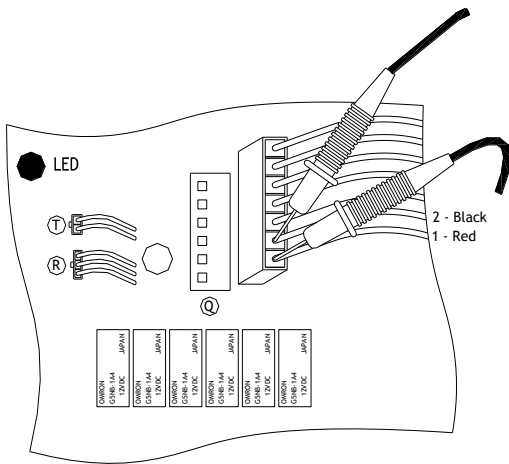
Test 11



Using a multimeter set on the kilo-ohms scale, measure the resistance with connector J unplugged from the PCB.

Solenoid Valve	Normal Voltage	Test Point	Diagnostic Point	Solenoid Valve	Normal Resistance	Test Point	Diagnostic Point
GISV	DC75 to DC120V	1 Yellow 5 Black	10	GISV	0.8Kohms to 2.2Kohms	1 Yellow 5 Black	10
1		2 White 5 Black	12	1		2 White 5 Black	12
2		3 Red 5 Black	13	2		3 Red 5 Black	13

Tests 10 and 12 - Diagnostic Point 9



Test 10: Conduct test with water flowing.

Using a multimeter set on the DC volts scale, measure the voltage between 1 Red and 2 Black at connector Q whilst plugged into PCB.

Normal voltage is between DC1.5 and 14.0V.

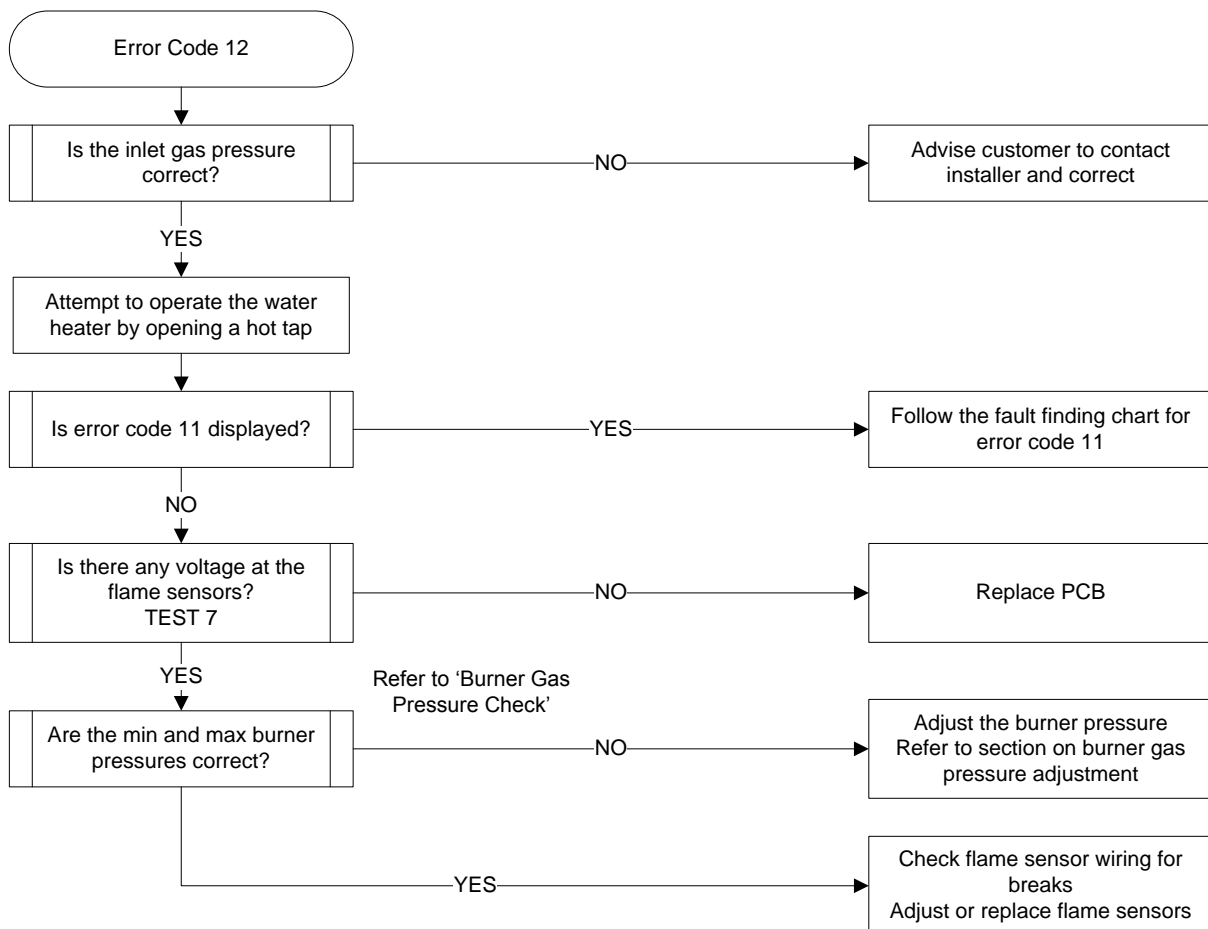


Test 12: Isolate power before conducting test.

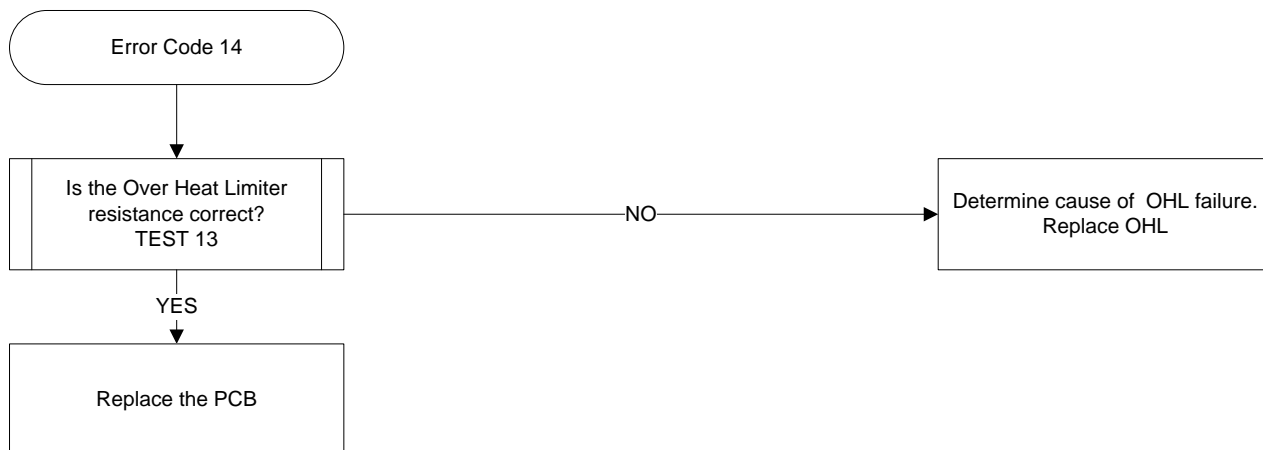
Using a multimeter set on the ohms scale, measure the resistance between 1 Red and 2 Black at connector Q whilst unplugged from the PCB.

Normal resistance is between 40 ohms and 80 ohms.

Error Code 12



Error Code 14



Fault Finding Test 13

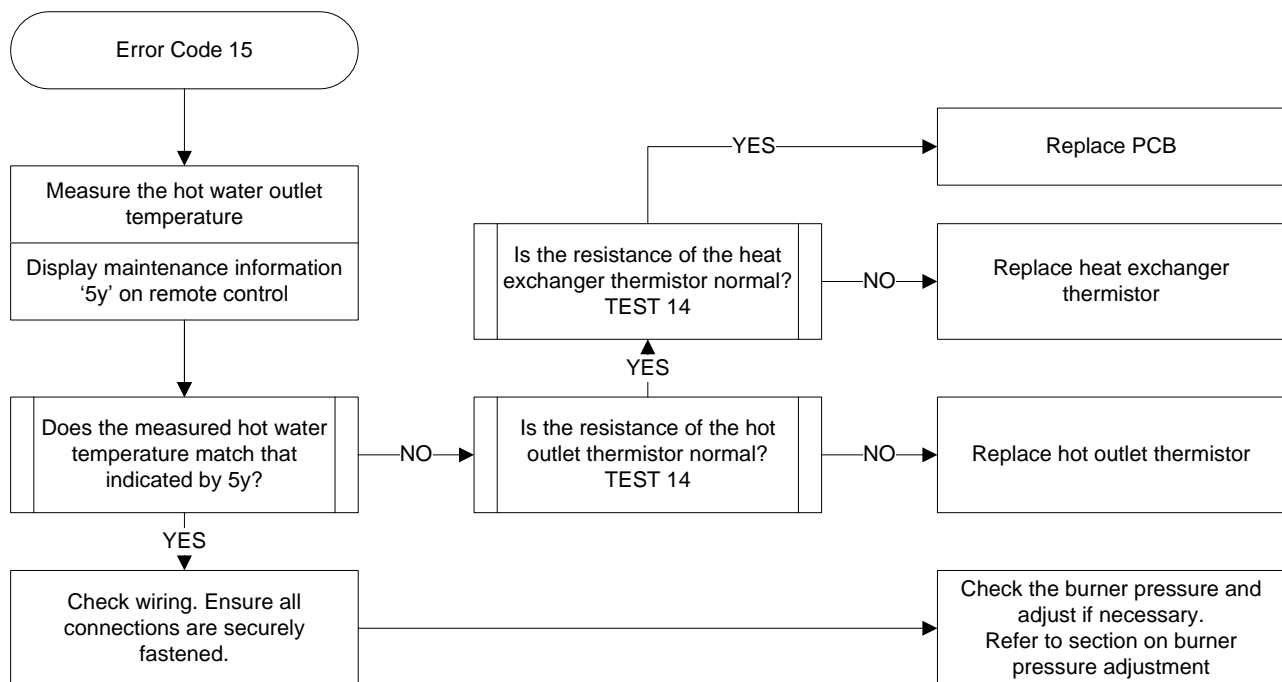
The diagram shows a control panel on the left with a "MAX." label and a switch labeled "OFF ON". To the right, a wiring harness is connected to a PCB. A multimeter is shown with its probes connected to the "T" (Temperature) and "R" (Resistance) terminals of the harness. A black dot labeled "LED" is also indicated on the harness.

Test 13

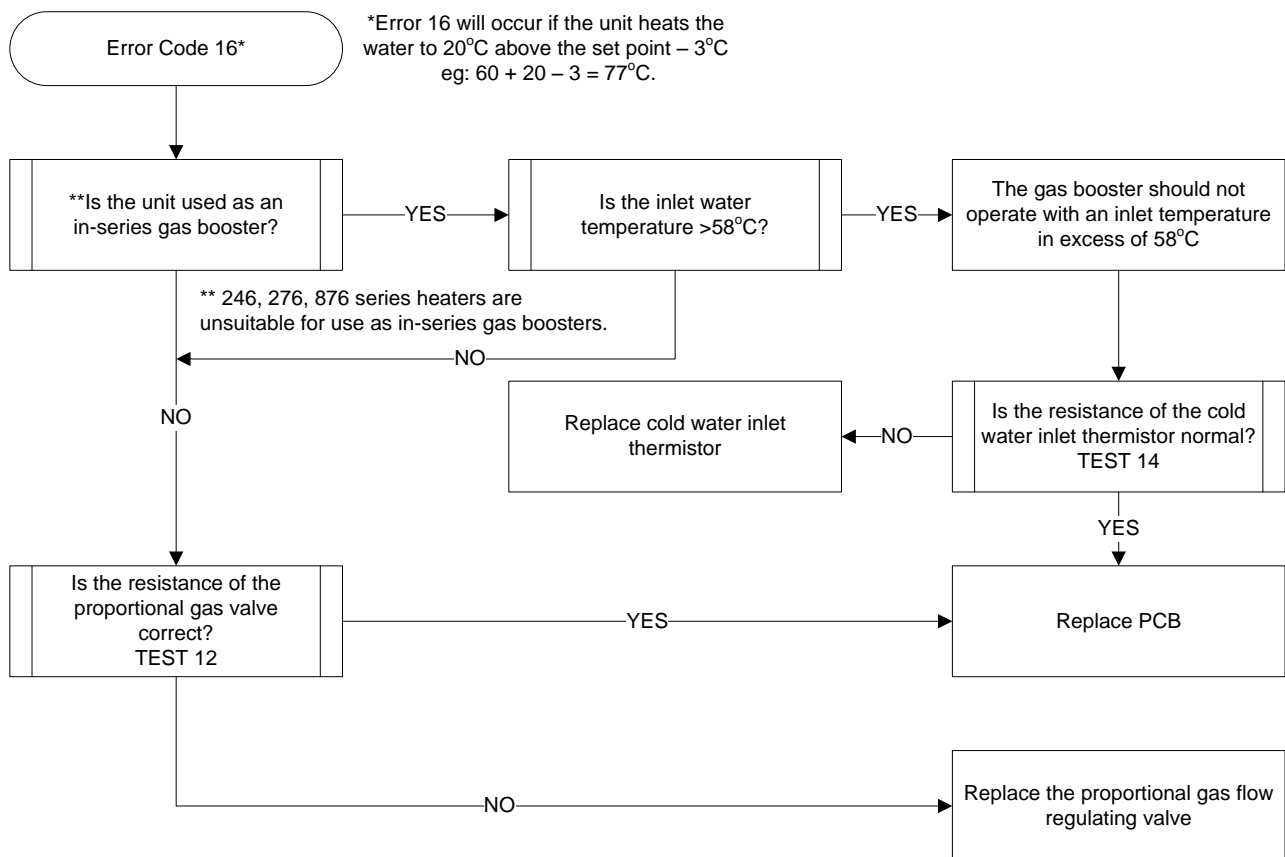
Unplug T connector from PCB and using a multimeter set on the kilo-ohms scale, measure the resistance of the Over Heat Limiter Assembly.

Normal resistance should be between 50 kilo-ohms - 500 kilo-ohms.

Error Code 15

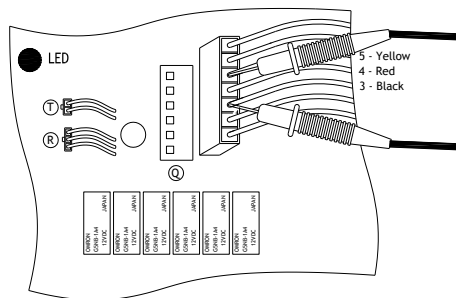


Error Code 16



Fault Finding Test 14

Test 14 – Diagnostic Points 5, 6, 7 & 16

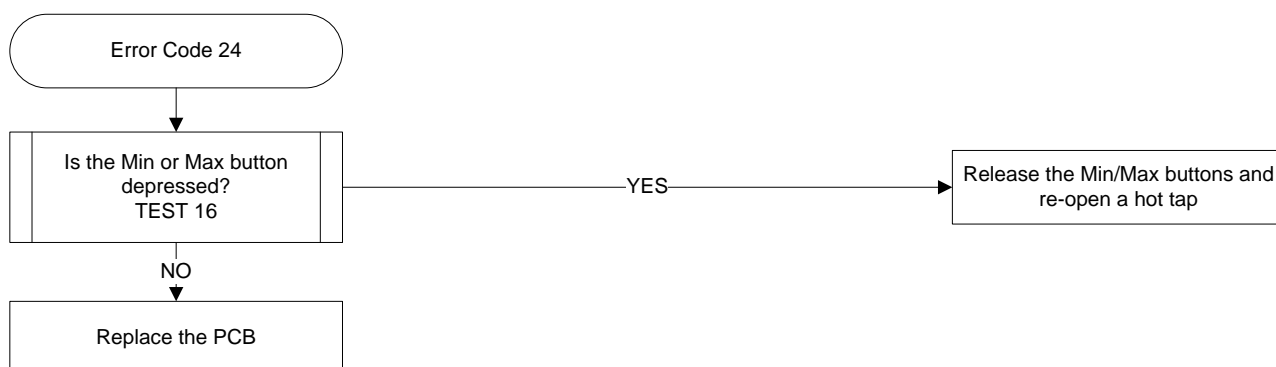


Isolate power before conducting test.

Using a multimeter set on the ohms scale, measure the resistance at connector Q whilst unplugged from the PCB.

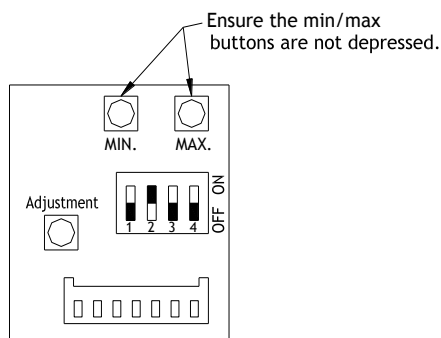
Maintenance display code	Diagnostic Point	Test Point	Measured Value
2y: Ambient Air Thermistor	16	7 Blue 3 Black	@20°C – 10.3 kilo-ohms @40°C – 4.9 kilo-ohms
3y: Cold Inlet Thermistor	5	6 White 3 Black	
4y: Heat Exchanger Thermistor	6	5 Yellow 3 Black	
5y: Hot Water Outlet Thermistor	7	4 Red 3 Black	

Error Code 24



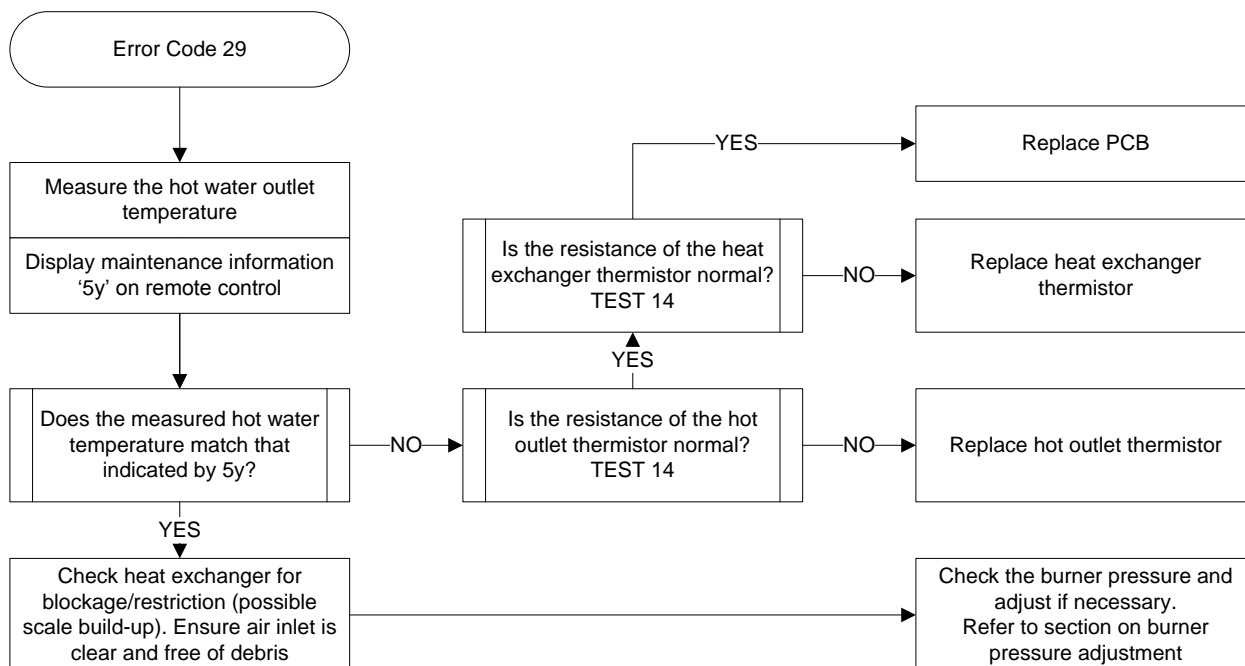
Fault Finding Test 16

Test 16

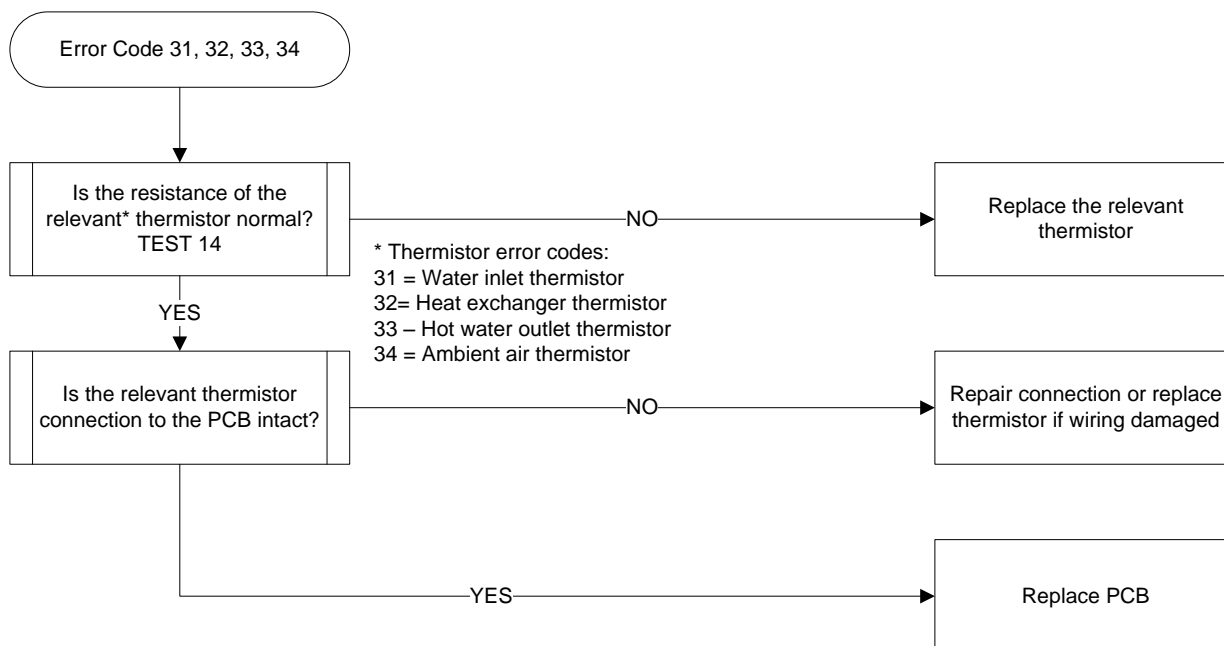


Are the controller cables or any other cables/components inadvertently depressing the Min or Max buttons on PCB?

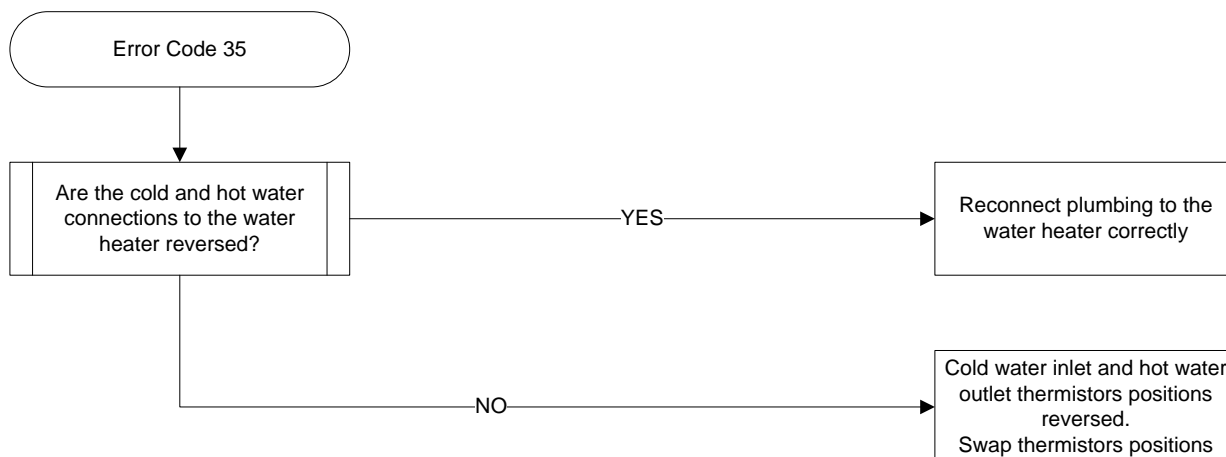
Error Code 29



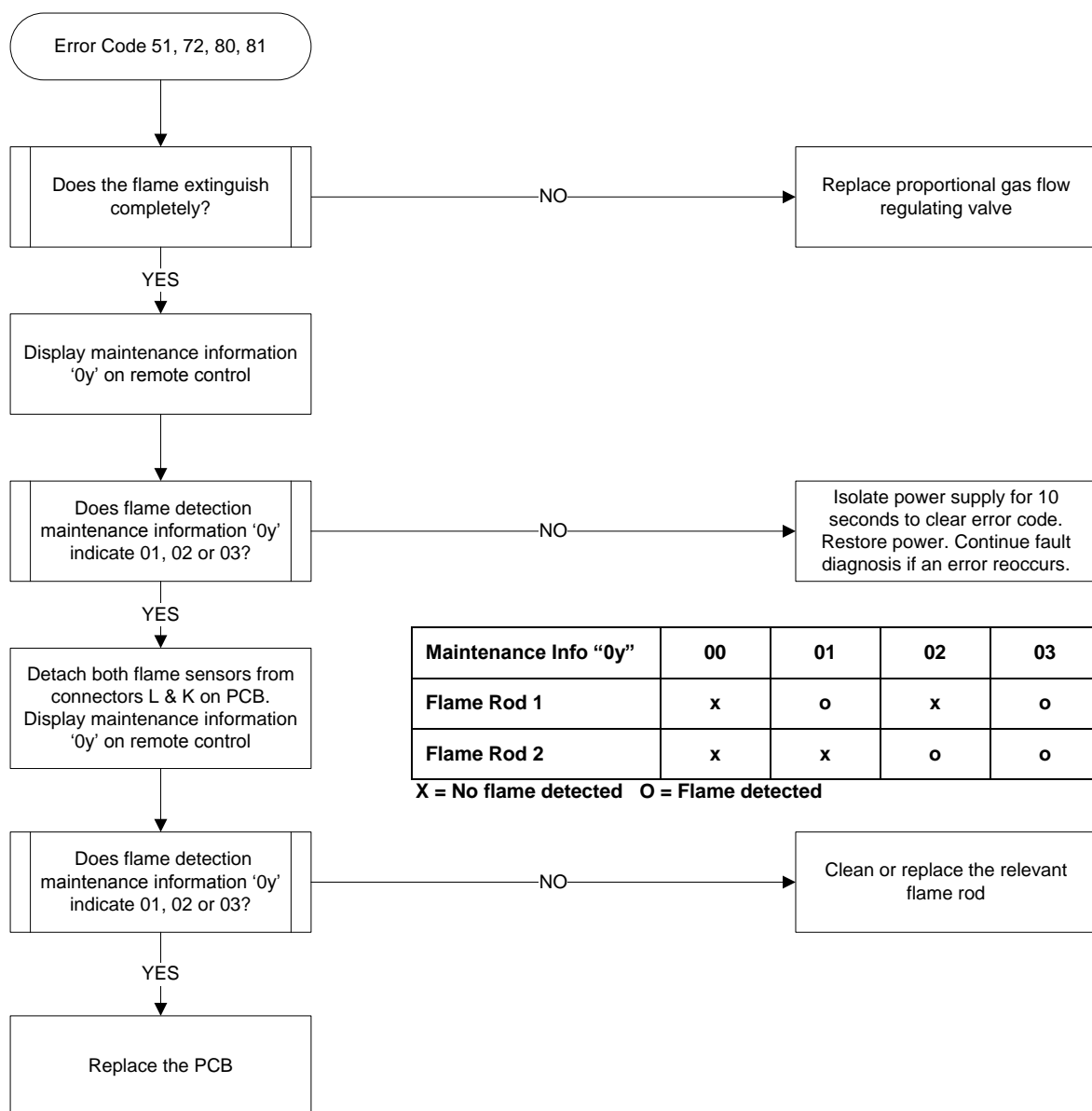
Error Code 31, 32, 33 & 34



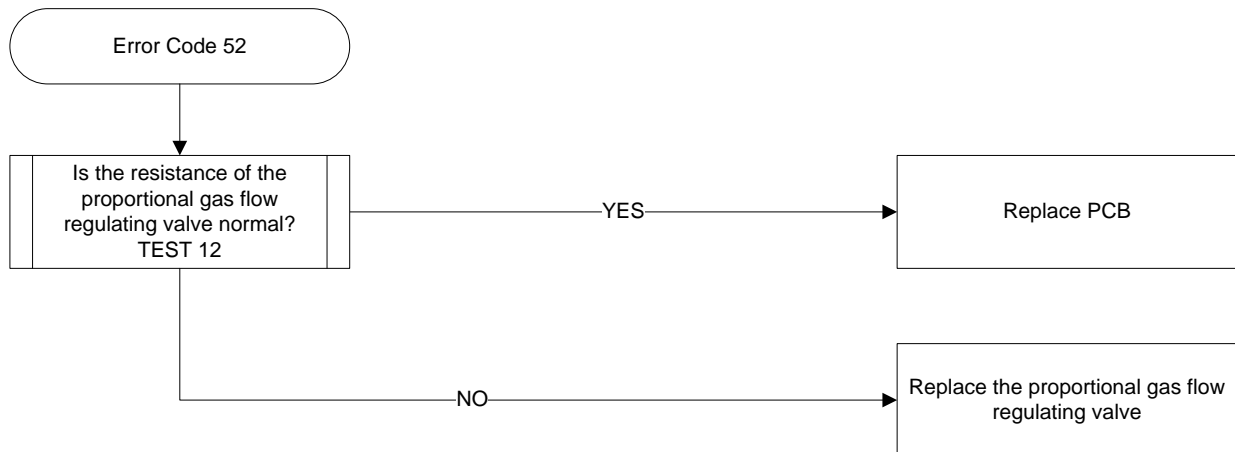
Error Code 35



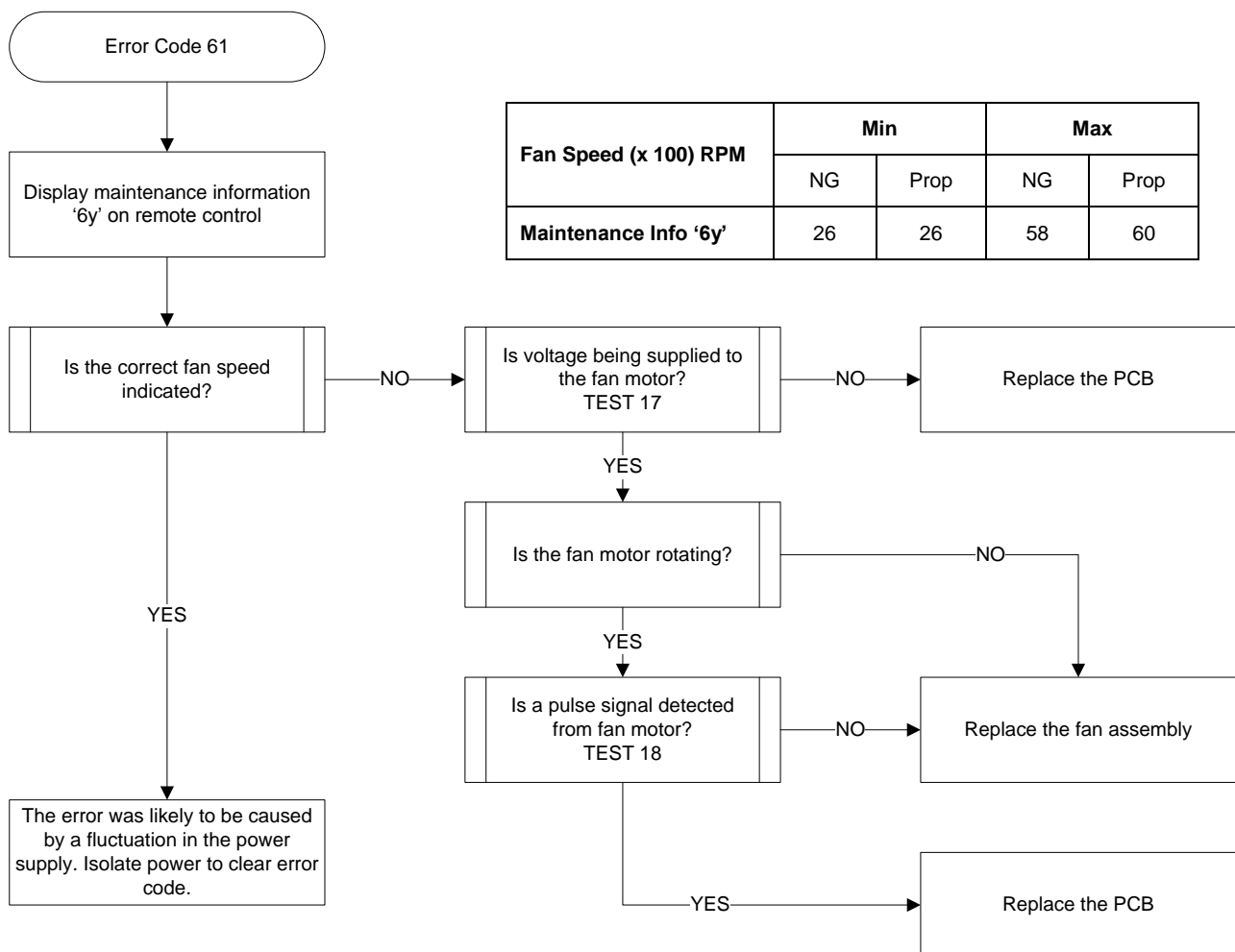
Error Code 51, 72, 80, 81



Error Code 52

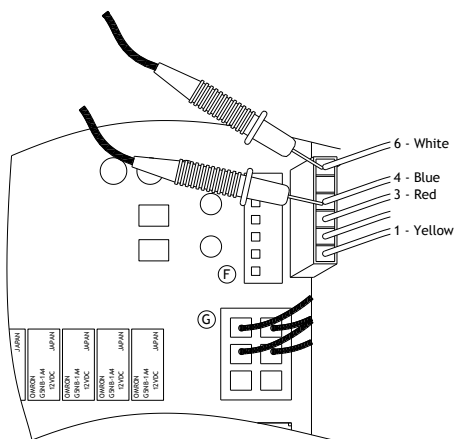


Error Code 61



Fault Finding Tests 17 & 18

Tests 17 and 18 – Diagnostic Point 4

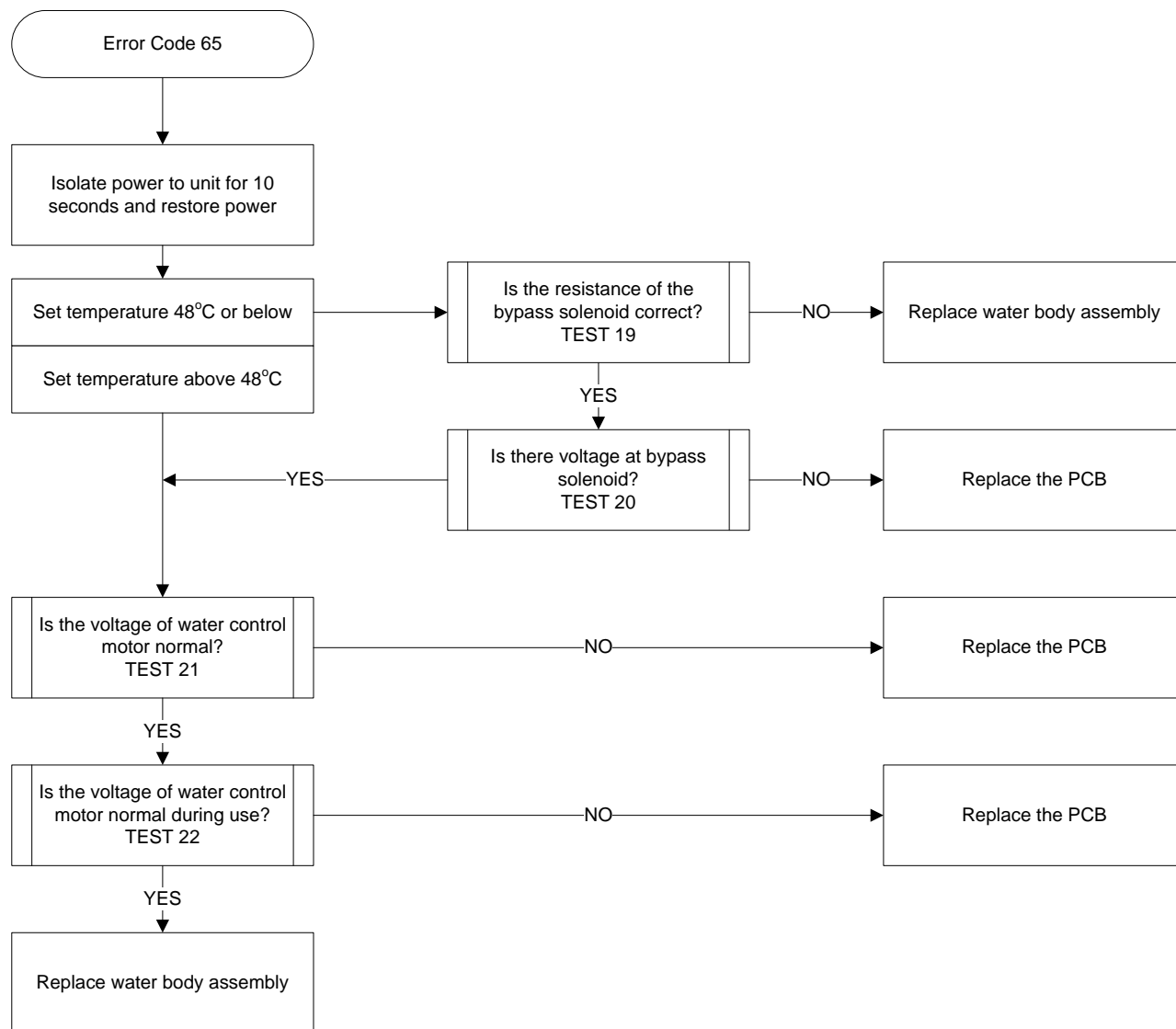


Conduct test with water flowing

Using a multimeter set on the DC volts scale, measure the voltage at connector F whilst plugged into PCB.

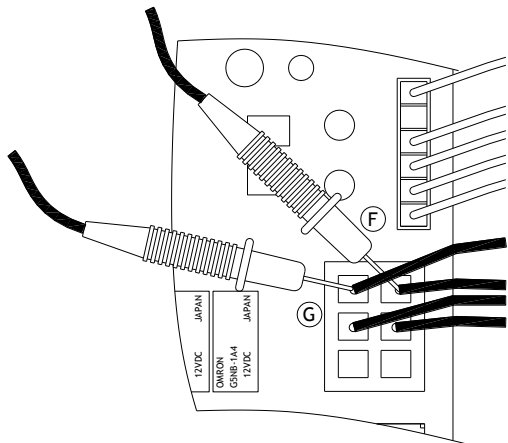
Test	Check Point	Measured Value
17	4 Blue – 6 White	DC120 - 160V
	3 Red – 4 Blue	DC12 - 18V
18	1 Yellow – 4 Blue	DC4 - 10V (or measurement by pulse counter of not less than 4800 pulses per minute)

Error Code 65



Fault Finding Tests 19 - 22

Test 19 and 20



TEST 19: Unplug connector G from the PCB and using a multimeter set on the kilo-ohms scale, measure the resistance between 3 Green and 6 Green.

Normal resistance should be between 0.6kilo-ohms and 2.8kilo-ohms.

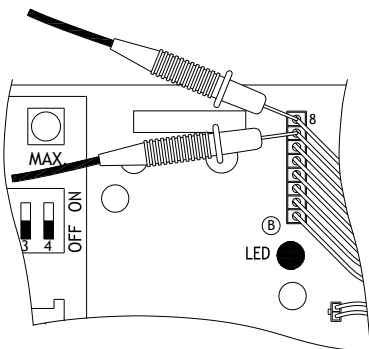


Conduct test with water flowing

TEST 20: Using a multimeter set on the DC volts scale, measure the voltage between 3 Green and 6 Green on connector G.

Normal voltage should be between DC70 – 110V.

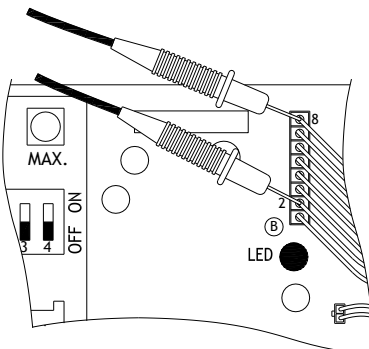
Test 21 - Diagnostic Point 15



Conduct test with water flowing

Using a multimeter set on the DC volts scale, measure the voltage at connector B whilst plugged into PCB.

Test 22 - Diagnostic Point 15

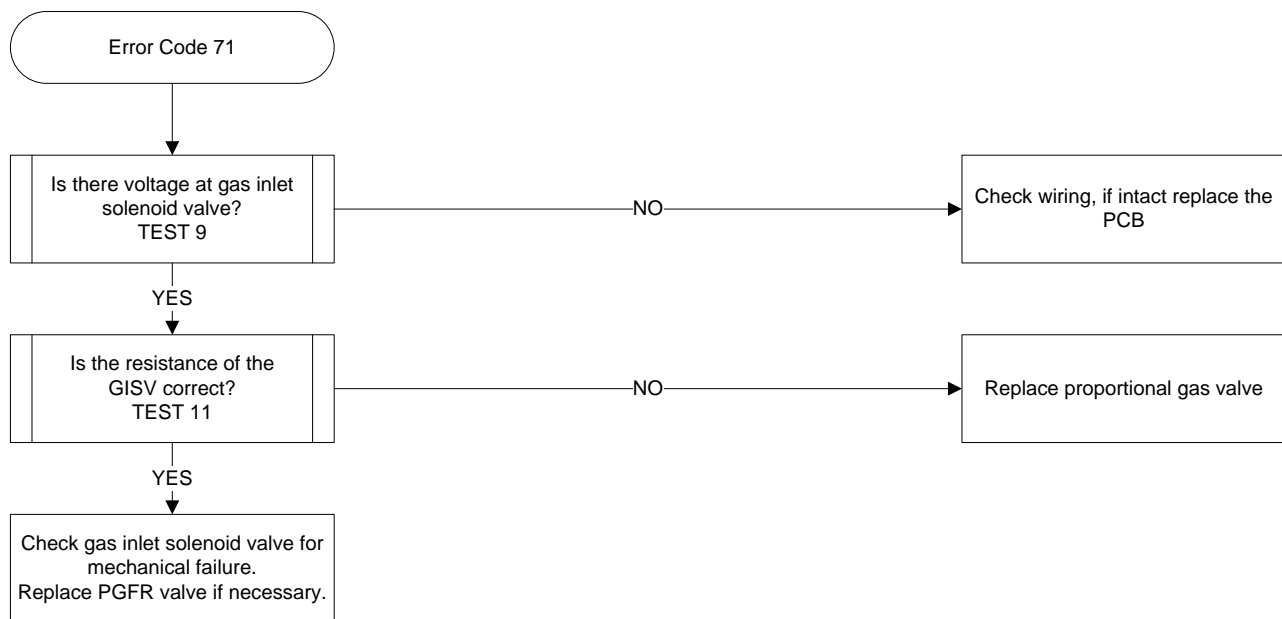


Conduct test with water flowing

Using a multimeter set on the DC volts scale, measure the voltage at connector B whilst plugged into PCB.

Check Point	Measured Value	Check Point	Measured Value
7 Red - 8 Black	DC8 – 16V	2 White - 8 Black	DC8 – 16V

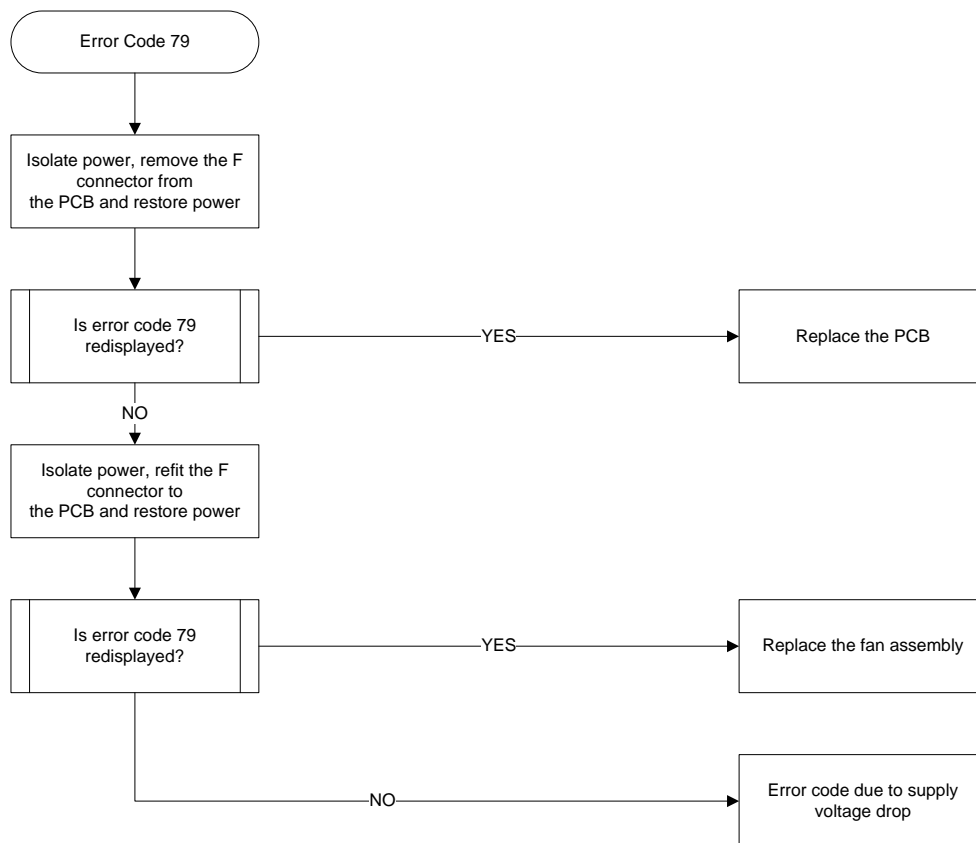
Error Code 71



Error Code 76

Check cables to all temperature controllers. Replace any cables that are open circuit. If no open circuit cables are found, replace the controller.

Error Code 79



Error Code 82

If error code 82 appears a new PCB is required to be fitted.

Error Code 99 & 10

Isolate power supply; clean the heat exchanger, fan and air inlet opening. Restore power supply and attempt ignition. If the error code re-appears, replace the PCB.

Burner Gas Pressure Check



Voltages up to 240 volts will be present within the water heater, take care not to touch wiring terminals. Use an insulated tool when operating the DIP switch or MIN and MAX buttons.

Minimum Burner Gas Pressure

1. Remove the front panel from the water heater.
2. Remove burner pressure test point screw and fit manometer.
3. Connect a controller (if one is not present) and turn on.
4. Open a hot tap slowly, to achieve the minimum flow rate at which the burners will ignite.
5. Press and hold the MIN button ("1L" is displayed on the controller) and observe the reading on the manometer.
6. Release the MIN button. If the reading observed in step 5 agrees with the rating label, no further adjustment is required.

Maximum Burner Gas Pressure

7. Open the hot tap fully to achieve maximum flow rate.
8. Press and hold the MAX button ("3H" is displayed on the display) and observe the reading on the manometer.
9. Release the MAX button. If the reading observed in step 8 agrees with the rating label, no further adjustment is required.
10. Turn the hot tap off.
11. Remove manometer and refit the burner test point screw ensuring the seal is gas tight.
12. Disconnect controller if connected in step 3.
13. Refit the front panel to the water heater.

Burner Gas Pressure Adjustment



Adjustment of the burner pressure will not overcome problems associated with poor supply pressure or incorrect gas supply pipe sizing.

Minimum Burner Gas Pressure

1. Remove the front panel from the water heater.
2. Remove burner test point screw and fit manometer.
3. Connect a controller (if one is not present) and turn on. **NOTE: *Isolate power while connecting the controller.***
4. Open a hot tap slowly, to achieve the minimum flow rate at which the burners will ignite.
5. Press and hold the adjuster button ("LH" is displayed on controller display)

NOTE: The adjuster button must be held down continuously through steps 5 and 6.

6. Press the MIN button and observe the reading on the manometer.

NOTE: While the MIN button is pressed, the gas pressure will at first increase then decrease, cycling between an upper gas pressure limit (39 on controller display) and a lower gas pressure limit (01 on controller display).

7. Release the MIN and adjuster buttons when the minimum test point pressure shown on the manometer agrees with the rating label.

NOTE: If the burners extinguish or an error code starts to flash on the controller display during this procedure, release the MIN and adjuster buttons, close the hot tap, clear the error code, turn on the water heater and recommence the procedure from step 3. To reset an error code, follow the procedure on page 28.

Maximum Burner Gas Pressure

8. Open the hot tap fully to achieve maximum flow rate.
9. Press and hold the adjuster button ("LH" is displayed on controller display).

NOTE: The adjuster button must be held down continuously through steps 9 and 10.

10. Press the MAX button and observe the reading on the manometer.

NOTE: While the MAX button is pressed, the gas pressure will at first increase then decrease, cycling between an upper gas pressure limit (39 on controller display) and a lower gas pressure limit (01 on controller display).

11. Release the MAX and adjuster buttons when the maximum test point pressure shown on the manometer agrees with the rating label.
12. Turn the hot tap off, remove manometer and refit the burner test point screw ensuring the seal is gas tight.
13. Disconnect the controller if connected in step 3. **Note: *Isolate power while disconnecting the controller.***
14. Refit the front panel to the water heater.

Component Replacement Procedures

Front Panel

1. **Isolate power, gas and water supplies.**
2. Remove four screws, two from the top and two from the bottom of the Front Panel.
3. Remove the Front Panel.

PCB Assembly

1. **Isolate power supply.**
2. Remove the Front Panel. Refer to 'Front Panel' procedure above.
3. Remove the retaining screw at top left hand side of the PCB.
4. Disconnect the multi-pin connectors from the PCB Assembly.
5. Undo the two red wires from transformer at bottom right hand side of PCB.
6. Carefully remove the PCB assembly.
7. Reassembly in reverse order of above. **Note:** When replacing a faulty PCB it is important to ensure that the correct PCB is installed. Fitment of an incorrect PCB may result in unit malfunction or a breach of the approval of the unit. Eg: If an 876 series heater is installed and an 874 series PCB is incorrectly used to replace a faulty PCB then the maximum temperature setting may exceed the approved maximum temperature setting of 48°C for an 876 series heater.
8. Restore power supply.

Lower Burner Assembly

1. Remove the Front Panel. Refer to 'Front Panel' procedure above.
2. Remove the fourteen screws retaining the Lower Burner Assembly. Includes three from the Proportional Gas Flow Regulating Valve and one retaining the Igniter.
3. Gently remove Lower Burner Assembly.
4. Reassemble in reverse order of above. Replace gaskets if required.
5. Test for gas leaks using soapy water solution.

Combustion Chamber Front Panel

1. Remove the Lower Burner Assembly. Refer to 'Lower Burner Assembly' procedure above.
2. Remove seven screws retaining the Combustion Chamber Front Panel.
3. Gently remove the Combustion Chamber Front Panel.
4. Reassemble in reverse order of above. Replace gaskets if required. NOTE: Ensure wiring to Igniter and Flame Sensors is not pinched during reassembly.
5. Test for gas leaks using soapy water solution.

Upper Burner Assembly

1. Remove the Combustion Chamber Front Panel. Refer to 'Combustion Chamber Front Panel' procedure on page 48.
2. Remove two retaining screws located on the underside of Upper Burner Assembly.
3. Remove the Upper Burner Assembly by sliding forward out of the Heat Exchanger.
4. Reassemble in reverse order of above being careful not to pinch or damage wiring. Replace gaskets if required.
5. Test for gas leaks using soapy water solution.

Flame Sensor

1. Remove the Upper Burner Assembly. Refer to 'Upper Burner Assembly' procedure above.
2. Remove the protective silicon tube and flame sensor lead from Flame Sensor A or B.
3. Loosen retaining screw from Flame Sensor Holder A or B and remove Flame Sensor.
4. Reassemble in reverse order of above. Replace gaskets if required.
5. Test for gas leaks with soapy water solution.

Igniter Electrode

1. Remove the Upper Burner Assembly. Refer to 'Upper Burner Assembly' procedure above.
2. Remove the protective silicon tube and spark lead from Igniter Electrode.
3. Loosen retaining screw from right hand flame sensor holder and remove the Igniter Electrode.
4. Reassemble in reverse order of above. Replace gaskets if required. NOTE: Ensure wiring to igniter and flame sensors is not pinched during reassembly.
5. Test for gas leaks with soapy water solution.

Proportional Gas Flow Regulating Valve

1. Remove the Lower Burner Assembly. Refer to 'Lower Burner Assembly' procedure on page 48.
2. Disconnect the gas supply pipe from the Gas Inlet Connection.
3. Remove the three silver screws from the Gas Inlet Connector on the outside of the water heater cabinet.
4. Carefully remove the Proportional Gas Flow Regulating Valve (PGFR) from the water heater.
5. Disconnect the multi-pin wiring plugs from the Gas Inlet Solenoid Valve (GISV), the Proportional Gas Flow Regulating Valve (PGFR) and Solenoid Valves 1 & 2.
6. Reassemble in reverse order of above. Replace gaskets if required.
7. Test for gas leaks with soapy water solution.

Power cord

1. **Switch off power at power point and unplug power cord from power point.**
2. Remove the Front Panel. Refer to 'Front Panel' procedure on page 48.
3. Undo cord clamp screw located on bottom right hand side of PCB and remove clamp.
4. Disconnect Earth connection at PCB holder.
5. Disconnect the power cable wiring loom plug and withdraw power cable through slot in the water heater jacket.
6. Reassemble in reverse order of above.

Water Body Assembly



Do not attempt to dismantle the servomotor, this is factory calibrated. Adjustments will render the water heater either inoperable or cause incorrect water temperature delivery.

1. Remove the Proportional Gas Flow Regulating Valve. Refer to 'Proportional Gas Flow Regulating Valve' procedure on page 49.
2. Disconnect the cold water supply pipe from the cold water Inlet Connection.
3. Unscrew the Water Drain Valve assembly (item 32) and Pressure Relief Valve (item 30) and drain the water heater.
4. Remove the screw from the Retaining Flange (item 26) and remove Flange.
5. Carefully disengage the two copper pipes from the Water Body Assembly.
6. Disconnect the wiring to the Bypass Solenoid.
7. Remove the four screws from the cold water Inlet Connector on the underside of the water heater cabinet and withdraw the Inlet Connector and o-ring from the base of the water heater.
8. Carefully remove the Water Body Assembly from the water heater.
9. Disconnect the multi-pin connectors from the servomotor, Water Flow Sensor and Cold Water Thermistor at the PCB. **Note:** Some wiring retainers will need to be released to allow wiring to be removed.
10. Remove the retaining screw from the Anti-Frost Heater and remove.
11. Reassemble in reverse order of above, replacing pipe o-rings (item 6) if required.
12. Test for gas and water leaks.

Flow Sensor Turbine

1. Isolate cold water supply.

2. Remove the Front Panel. Refer to 'Front Panel' procedure on page 48.
3. Unscrew the Water Drain Valve assembly (item 32) and Pressure Relief Valve (item 30) and drain the water heater.
4. Disconnect the cold water supply pipe from the cold water Inlet Connection.
5. Disconnect the Bypass Solenoid wiring loom plug.
6. Remove two retaining screws holding the Flow Sensor to the Water Body Assembly and remove Flow Sensor.
7. Using a flat blade screwdriver lever the metal disc and o-ring from the Flow Sensor housing on the Water Body Assembly. Lever the disc out by placing the shaft of the screwdriver across the disc with the tip of the screwdriver on the far inside edge of the disc.
8. Remove the four screws from the cold water Inlet Connector and withdraw the Inlet Connector and o-ring from the base of the water heater.
9. Gently withdraw the Flow Sensor Turbine out through the water inlet of the water Body Assembly using a pair of long nose pliers.
10. Reassemble in reverse order of above ensuring open slot on turbine is centred and facing towards the face of the flow sensor.

Combustion Fan Motor

1. Remove the PCB Assembly. Refer to 'PCB Assembly' procedure on page 48.
2. Remove the two screws retaining the Power Filter (item 9) to the Combustion Fan Motor.
3. Remove the remaining three screws retaining the Fan Motor and lift Fan Motor clear.
4. Disconnect the multi-pin wiring plug from the Fan Motor.
5. Reassemble in reverse order of above.

Igniter

1. Remove the Upper Burner Assembly. Refer to 'Upper Burner Assembly' procedure on page 49.
2. Disconnect black high voltage lead from Igniter Electrode on the right hand side of the Upper Burner Assembly.
3. Disconnect the multi pin connector from the Igniter.
4. Replace the Igniter.
5. Reassemble in reverse order of above. NOTE: Ensure wiring to Igniter Electrode and Flame Sensors is not pinched during reassembly.

Anti-Frost Heaters

1. Remove the PCB Assembly. Refer to 'PCB Assembly' procedure on page 48.
2. Disconnect connector plugs at the Anti-Frost Thermostat and Power Cord

Heat Exchanger and Hot Water Outlet Connection Heaters

3. Remove the two screws from the hot water Outlet Flange to release the hot water outlet Anti-Frost Heater.
4. Unclip the 2 Anti-Frost Heaters from the Heat Exchanger (Note the positions of both).
5. Remove the Anti-Frost Heaters and wiring (Some wiring retainers will need to be released to remove wiring).
6. Reassemble in reverse of above ensuring anti-frost heaters are fitted in correct positions.

Water Body Assembly Heater

2. Remove the Water Body Assembly (item 24 on exploded view). Refer to 'Water Body Assembly' procedure on page 50.
3. Remove the Anti-Frost Heater retaining clip.
4. Remove the Anti-Frost Heater and wiring (Some wiring retainers will need to be released to remove wiring).
5. Reassemble in reverse order of above.

Heat Exchanger Removal

1. Remove the Upper Burner Assembly. Refer to 'Upper Burner Assembly' procedure on page 49.
2. Remove the two Flame Sensor leads (items 12 and 13) and Ignition Lead from the rubber cable glands in the underside of the Heat Exchange Assembly.
3. Remove the two screws retaining the Power Filter (item 9) from the Fan Assembly and reposition Power Filter clear of Fan Assembly.
4. Remove the screw from the Water Body Assembly Flange (item 26) and remove Flange.
5. Carefully disengage the two pipes from the Water Body Assembly.
6. Remove the two screws from the hot water Outlet Flange retaining the hot water outlet pipe and carefully disengage the pipe.
7. Disconnect the multi-pin wiring connector from the Heat Exchanger Thermistor.
8. Disconnect the anti-frost wiring loom connector at the Anti-Frost Thermostat (item 15) and the hot water outlet Anti-Frost Heater (item 7). Remove Anti-Frost Heater from hot the Outlet Connector.
9. Open the Over Heat Limiter to gain access to Heat Exchanger Assembly. Remove wiring retainer that joins Anti-Frost Heater wiring to the Over Heat Limiter wiring.
10. Remove the four screws retaining the Heat Exchanger. One from each side of the Heat Exchanger and two from the top of the water heater cabinet above the flue outlet.
11. Remove Heat Exchanger by gently lifting the assembly up and clear of the water heater cabinet.
12. Disconnect the multi-pin wiring plug from the Fan Motor to completely free Heat Exchanger Assembly from the water heater.

Heat Exchanger Replacement

1. Remove the Heat Exchanger. Refer 'Heat Exchanger Removal' procedure on page 52.
2. Remove the Heat Exchanger Thermistor, Anti-Frost Heaters, Fan Assembly and Fan Cowling from the old Heat Exchanger and refit to the replacement Heat Exchanger.
3. Check the Over Heat Limiter. Replace if damaged or open circuit.
4. Reassemble in reverse order of above.
5. Test for gas leaks using soapy water solution
6. Check for water leaks.
7. **Check and if necessary adjust the MIN and MAX burner gas pressures.** Refer to 'Burner Gas Pressure Check' procedure on page 46 and 'Burner Gas Pressure Adjustment' procedure on page 47.

Flow Sensor

1. Isolate cold water supply.
2. Remove the Front Panel. Refer to 'Front Panel' procedure on page 48.
3. Disconnect the Flow Sensor multi-pin wiring plug at the PCB.
4. Remove two screws retaining the Flow Sensor at the base of the Water Body Assembly.
5. Remove the Flow Sensor (Note: water may escape during this procedure).
6. Reassemble in reverse order of above.

Bypass Solenoid

The Bypass Solenoid is only available as part of the Water Body Assembly. Refer to 'Water Body Assembly' procedure on page 50.

Thermistors

1. Isolate cold water supply.
2. Remove the Front Panel. Refer to 'Front Panel' procedure on page 48.
3. Relieve water pressure through a hot tap.
4. Locate the Thermistor requiring replacement. **Note:** The PCB will need to be removed to gain access to the Hot Outlet Thermistor. Refer to PCB Assembly procedure on page 48.
5. Disconnect the relevant multi-pin plug from the PCB. **Note:** Some wiring retainers will need to be released to allow wiring to be removed.
6. Remove the retaining screws and withdraw the Thermistor taking care not to damage the o-ring (**Note:** with the exception of the Ambient Air Thermistor, water may escape during this procedure).
7. Reassemble in reverse order of above.

Over Heat Limiter

Replacement of the Over Heat Limiter requires removal and possible replacement of the Heat Exchanger.

1. Remove the Heat Exchanger. Refer 'Heat Exchanger Removal' procedure on page 52.
2. Remove the two white wires from the terminal block on the right hand side of the Over Heat Limiter.
3. Remove the two plastic rivets retaining the Over Heat Limiter to the back of the water heater cabinet and remove the Over Heat Limiter.
4. Inspect the Heat Exchanger for holes or combustion damage. (Replace Heat Exchanger if necessary)
5. Reassemble in reverse order of above (Note: Ensure all multi-pin plugs are reconnected and all wiring is neatly repositioned and retained to prevent damage during operation).
6. Test operation of water heater.
7. **Check and if necessary adjust the MIN and MAX burner gas pressures.** Refer to 'Burner Gas Pressure Check' procedure on page 46 and 'Burner Gas Pressure Adjustment' procedure on page 47.

Controller

1. **Isolate power at the water heater.**
2. Remove the small Phillips head screw from the bottom of the Controller.
3. Gently pivot the Controller up from the bottom and then lift up and off upper retaining lugs.
4. **Kitchen Controller:** Disconnect the wiring from the terminals on the back of the Controller (Note: The wiring is not polarity sensitive).
Bathroom Controllers: Disconnect the multi-pin plug.
5. Reassemble in reverse order of above.

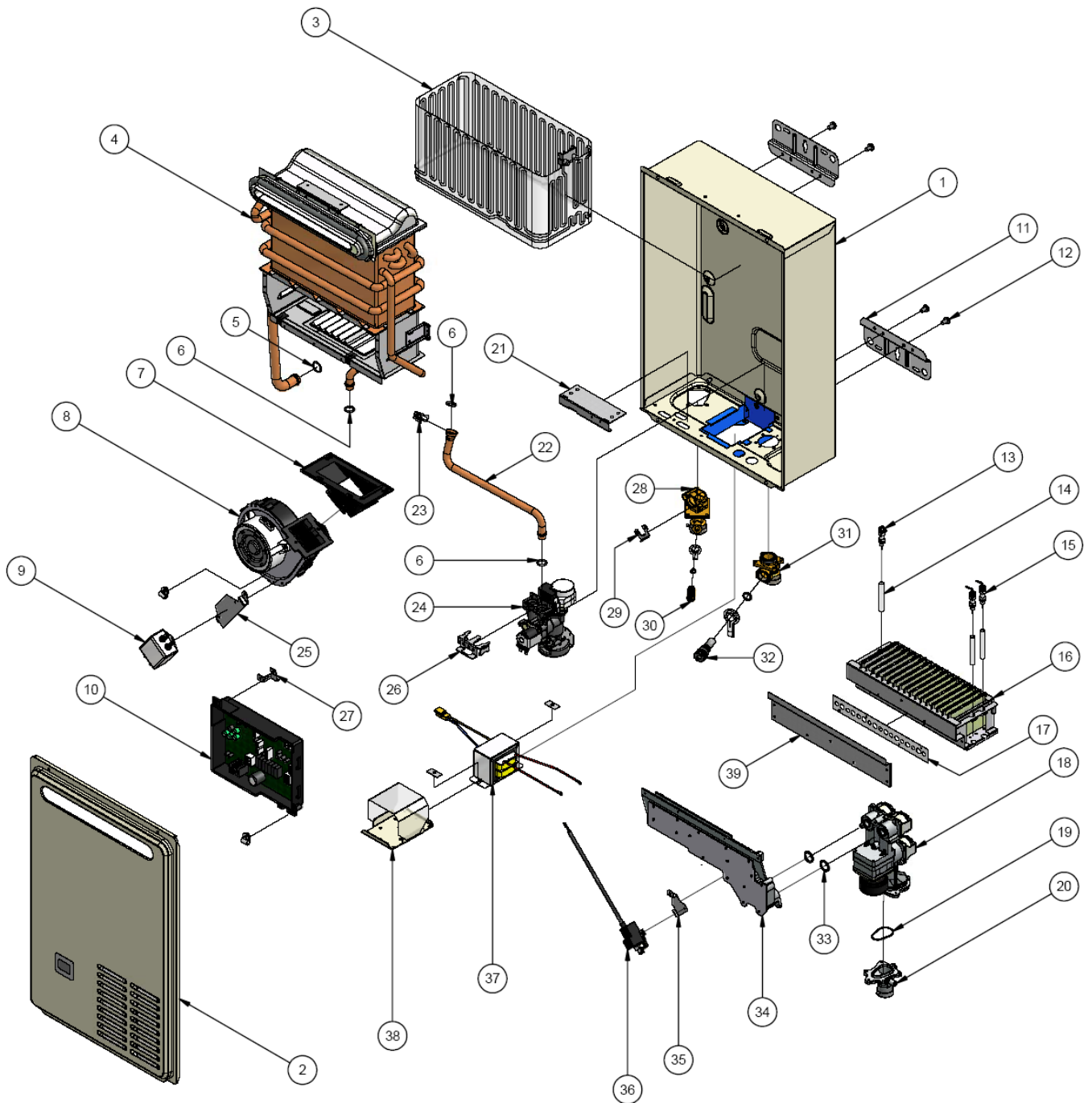
Transformer

1. Remove the Front Panel. Refer to 'Front Panel' procedure on page 48.
2. Disconnect the Transformer secondary windings from the bottom right hand side of the PCB (2 x red wires).
3. Disconnect the multi-pin plug to the Transformer.
4. Remove the four outside screws on the underside of the water heater retaining the Transformer base to the water heater cabinet.
5. Lower the Transformer and base plate from the base of the water heater.
6. Remove two screws retaining Transformer to the transformer base plate.
7. Reassemble in reverse order of above.

Power Filter

1. Remove the PCB Assembly. Refer to 'PCB Assembly' procedure on page 48.
2. Disconnect the incoming and outgoing Power Filter wiring loom plugs.
Note: Some wiring retainers will need to be released to allow wiring to be removed.
3. Remove the two screws retaining the Power Filter to the mounting bracket on the Fan Assembly.
4. Remove the Power Filter. **Note:** An earth wire is connected to the power filter mounting bracket. Ensure it is reconnected when the Power Filter is refitted.
5. Reassemble in reverse order of above.

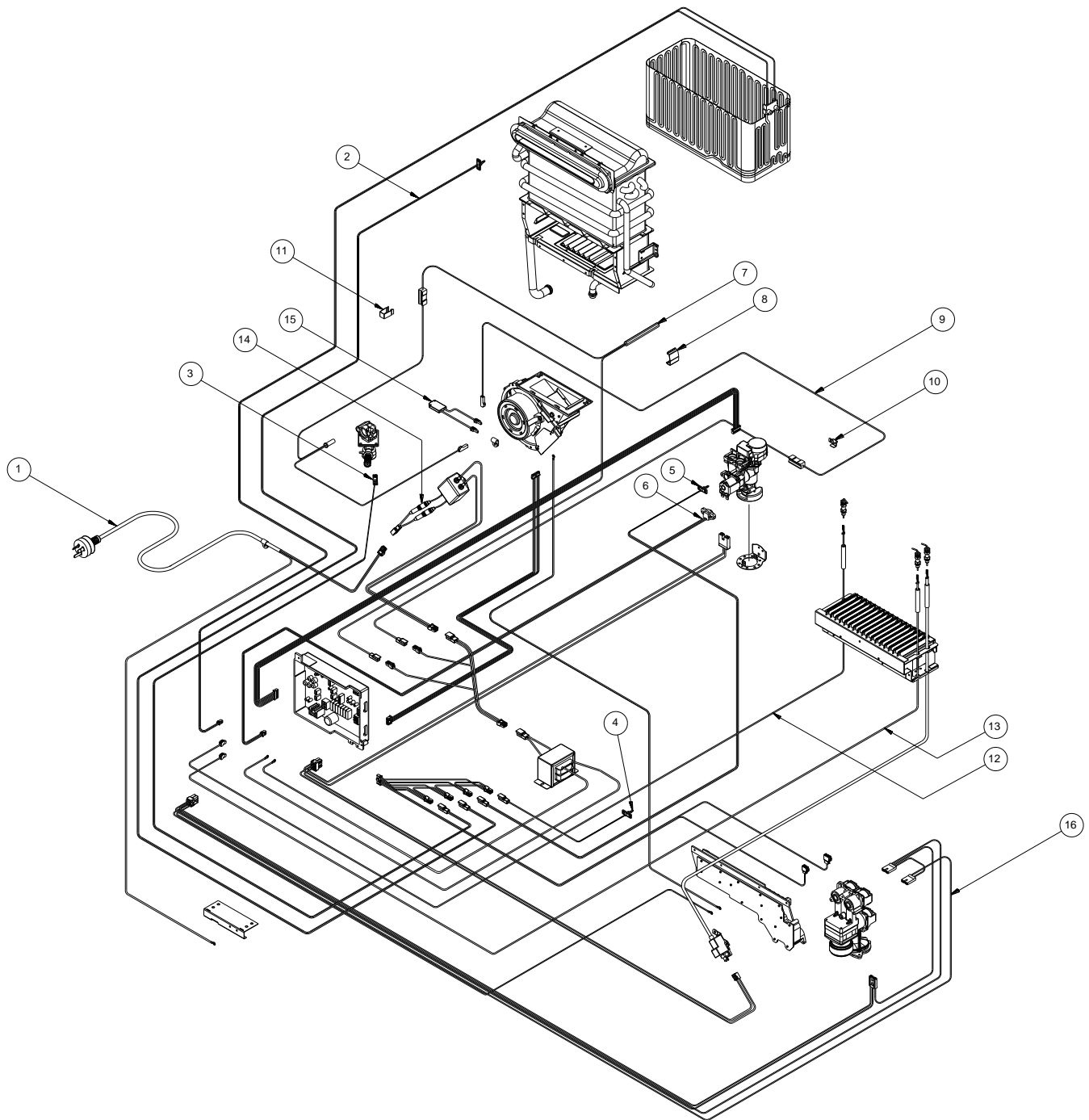
Exploded View – Water Heater



Replacement Parts List – Water Heater

No.	Description	Part Number
1	Heater Cabinet	N/A
2	Front Cover Assembly	31-86022-00
3	Over Heat Limiter	31-80280-00
4	Combustion Chamber Kit – Natural Gas	31-86142-00
	Combustion Chamber Kit – LPG	31-86141-00
5	O-Ring P16 EPT	WH0020034
6	O-Ring P-12.7 EPT	WH0020035
7	Fan adapter	N/A
8	Fan Assy	31-61073-00
9	Power Filter	31-86104-00
10	PCB Assy to suit 874018NF	31-86150-05
	PCB Assy to suit 874018PF	31-86150-06
	PCB Assy to suit 874020NF	31-86150-07
	PCB Assy to suit 874020PF	31-86150-08
	PCB Assy to suit 876018NF	31-86150-09
	PCB Assy to suit 876018PF	31-86150-10
	PCB Assy to suit 876020NF	31-86150-11
	PCB Assy to suit 876020PF	31-86150-12
11	Insulation Type Bracket	WH0020002
12	Pan Head 5 x 10	09-11653-00
13	Electrode E	31-61465-00
14	Silicon Tube	31-53479-00
15	Electrode	31-53439-00
16	Upper Burner Assy – Natural Gas	31-66311-00
	Upper Burner Assy – LPG	31-61111-00
17	Burner Damper – Natural Gas	31-80344-00
	Burner Damper - LPG	31-80359-00
18	Proportional Gas Flow Regulating Valve	31-86051-00
19	Gasket	31-53256-00
20	Gas Inlet Connector ¾"	31-86054-00
21	PCB Assy Holder	31-63097-00
22	By-pass Connecting Assy	31-86121-00
23	Quick Fastener	31-53347-00
24	Water Body Assy	31-86057-00
25	Power Filter Bracket	N/A
26	Flange	10-88332-00
27	PCB Holder	31-63096-00
28	Hot Water Outlet Connector ¾"	31-86062-00
29	Flange	10-88399-00
30	Safety Valve Assy (Pressure Relief)	04-38888-00
31	Water Inlet Connector	10-65408-00
32	Water Drain Valve Assy	WH0020024
33	Gasket	09-03478-00
34	Lower Burner Assy – Natural Gas	31-86046-00
	Lower Burner Assy – LPG	31-61103-00
35	Igniter Mounting Bracket	N/A
36	Igniter Assy	09-74560-00
37	Transformer Assy	31-86102-00
38	Transformer Box Bottom Holder	31-86111-00
39	Burner Front Panel Assy	31-61065-00

Exploded View - Wiring



Replacement Parts List - Wiring

No.	Description	Part Number
1	Power Supply Cord Assy	31-76652-00
2	Heat Exchanger Thermistor	09-76934-00
3	Outlet Hot Water Thermistor	09-76932-00
4	Ambient Air Thermistor	31-63794-00
5	Water Inlet Thermistor	09-76931-00
6	Hall IC Assy C	31-50245-00
7	Anti-Frost Heater B	31-71643-00
8	Heater Holder B	WH0020051
9	Anti-Frost Heater A	31-71644-00
10	Heater Holder	N/A
11	Heater Holder C	WH0020050
12	FR Connecting Cord Assy A	31-63738-00
13	FR Connecting Cord Assy B	31-63739-00
14	Fuse	WH0020069
15	Thermostat	20-57072-00
16	120V Wire Assy	31-86114-00

Note: For controller and controller cable part numbers refer to page 12.

Gas Conversion Procedure

The models covered in these service instructions are unsuitable for gas type conversion in the field. Contact Rheem Service for further instruction if gas type conversion is required.

Warranty

Electronic Instantaneous Gas Water Heater Warranty (Australia only)

Warranty conditions

1. This warranty is applicable only to water heaters manufactured from 1st January 2001.
2. The water heater must be installed in accordance with the Rheem water heater installation instructions, supplied with the water heater, and in accordance with all relevant statutory and local requirements of the State in which the water heater is to be installed.
3. Where a failed component or water heater is replaced under Warranty, the balance of the original warranty period will remain effective. The replaced part or water heater does not carry a new warranty.
4. Where the water heater is installed outside the boundaries of a metropolitan area as defined by Rheem or further than 25 km from a regional Rheem Service branch office, or an Accredited Service Agent, the cost of transport, insurance and travelling costs between the nearest Rheem Service Accredited Service Agent's premises and the installed site shall be the owner's responsibility.
5. The warranty only applies to the water heater and original or genuine company component replacement parts and therefore does not cover any plumbing or electrical parts supplied by the installer and not an integral part of the water heater, eg. pressure limiting valve; isolation valves, non-return valve, electrical switches, pumps, or fuse.
6. The water heater must be sized to supply the hot water demand in accordance with the guidelines in Rheem water heater literature

Warranty Exclusions

1. REPAIR AND REPLACEMENT WORK WILL BE CARRIED OUT AS SET OUT IN THE RHEEM ELECTRONIC INSTANTANEOUS WATER HEATER WARRANTY ABOVE, BUT THE FOLLOWING EXCLUSIONS MAY CAUSE THE WATER HEATER WARRANTY TO BECOME VOID, AND MAY INCUR A SERVICE CHARGE AND COST OF PARTS.
 - a) Accidental damage: Acts of God, failure due to misuse; incorrect installation; attempts to repair the water heater other than by a Rheem Accredited Service Agent or the Rheem Service Department.
 - b) Where it is found there is nothing wrong with the water heater, where the complaint is related to excessive discharge from the temperature and pressure relief valve due to high water pressure; where there is no flow of hot water due to faulty plumbing; where water leaks are related to plumbing and not the water heater components; where there is a failure of gas, electricity or water supplies; where the supply of gas, electricity or water does not comply with relevant codes or acts.
 - c) Where the water heater or water heater component failed directly or indirectly as a result of: excessive water pressure; excessive temperature and/or thermal input; corrosive atmosphere; ice formation in the pipework to or from the water heater; ice formation in the water ways of a water heater without a frost protection system; ice formation in the waterways of a water heater with a frost protection system where the electricity supply has been switched off or has failed and the water heater has not been drained in accordance with the instructions; ice formation in the waterways of a water heater with a frost protection system due to an ambient temperature below - 20°C (including wind chill factor)
 - d) Where the water heater is located in a position that does not comply with the Rheem water heater installation instructions or relevant statutory requirements, causing the need for major dismantling or removal of cupboards, doors or walls, or use of special equipment to bring the water heater to floor level, or to a serviceable position.
 - e) Repairs to the water heater due to scale formation in the waterways when the water heater has been connected to a harmful water supply as outlined in the Owner's Guide and Installation Instruction booklet.
2. SUBJECT TO ANY STATUTORY PROVISIONS TO THE CONTRARY, THIS WARRANTY EXCLUDES ANY AND ALL CLAIMS FOR DAMAGE TO FURNITURE, WALLS, FOUNDATIONS OR ANY OTHER CONSEQUENTIAL LOSS EITHER DIRECTLY OR INDIRECTLY DUE TO LEAKAGE FROM THE WATER HEATER.

In addition to this warranty, the Trade Practices Act 1974 and similar laws in each state and territory provide the owner under certain circumstances with certain minimum statutory rights in relation to your Rheem water heater. This warranty must be read subject to that legislation and nothing in this warranty has the effect of excluding, restricting those rights.

NOTE: Every care has been taken to ensure accuracy in preparation of this publication. No liability can be accepted for any consequences which may arise as a result of its application.

Rheem Australia Pty Ltd

ABN 21 098 823 511

Document Revision History

Title: 16-20L Continuous Flow Gas Water Heater Service Instructions	Document N°: TM040
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REV	Details of change	D.O.I.
A	Service instructions issued for 16-20L continuous flow gas water heater	06/09